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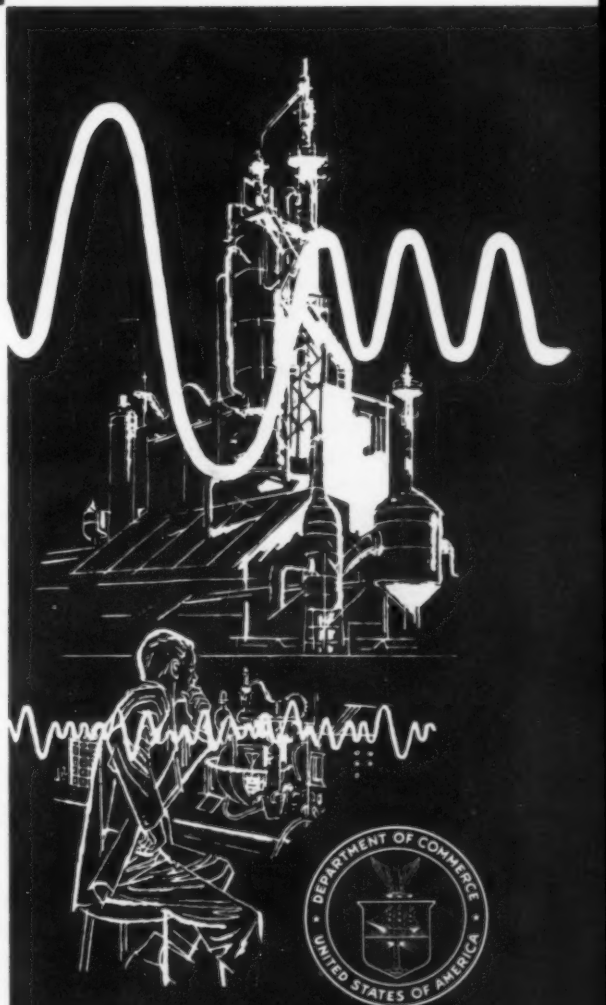

U. S. DEPARTMENT OF COMMERCE

Office of Technical Services

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U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, *Secretary*

OFFICE OF TECHNICAL SERVICES
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***VETERINARY MEDICINE**

A COLLECTION OF ORGANIZATIONAL AND METHODOLOGICAL MATERIALS ON ANTHRAX PUBLISHED BY THE STATE PUBLISHING HOUSE OF MEDICAL LITERATURE (MEDGIZ): 1962, MOSCOW. THERE ARE 18 INDIVIDUAL PAPERS (EXCERPTS) COVERING BOTH THE HUMAN AND ANIMAL ASPECTS OF THIS DISEASE.
AD-291 635 DIV. 16

***VIRUS DISEASES**

EARLY RUSSIAN ENTOMOLOGICAL SURVEY FOR THE DETERMINATION OF THE NATURAL FOCALIZATION OF TAIGA ENCEPHALITIS: TICK VECTORS, AND METHODS OF CONTROLLING THE VECTORS.
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***VIRUS PNEUMONIA**
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A COMPREHENSIVE BIBLIOGRAPHY ON PSITTACOSIS WHICH INCLUDES PAPERS PUBLISHED IN THE 1800'S

TO JANUARY, 1950 ARRANGED UNDER THE HEADINGS: CLINICAL PICTURE, EPIDEMIOLOGY, TREATMENT, PREVENTION, CONTROL, ETIOLOGY, AND EXPERIMENTAL INFECTIONS IS PRESENTED.
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***WEATHER FORECASTING**

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PRELIMINARY DAILY NORTHERN HEMISPHERE 10-MILLIBAR SYNOPTIC WEATHER MAPS FOR APRIL-JUNE, 1962.
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AD-291 501 DIV. 2

THE WIND SPECTRA OF THE TROPOSPHERE AND LOWER STRATOSPHERE OVER NORTH AMERICA.
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POLYMERIZATION WITHIN CELLULOSE MATRICES. EXCHANGE REACTION BETWEEN CALCIUM AND CARBOXYL GROUPS IN CELLULOSE. NATURE OF THE STRENGTH REINFORCEMENT.
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IMPROVED ZN BR2-FILLED SHIELDING WINDOW FOR HOT CELL.
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TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-291 410 Div. 1, 9
(TISTA/GEC) OTS price $.75

Biomedical Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
BOUNDARY LAYER NOISE MEASUREMENTS OF THE F-102 AIRCRAFT.
Final rept. on Biomechanics of Aerospace Operations,
by Frank J. Leech and Virgil E. Sackschewsky.
Aug 62, 19p. incl. illus. 11 refs.
(Proj. 7231; In cooperation with Directorate of Engineering Test, Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.)
(MRL TDR 62-71) Unclassified report

DESCRIPTORS: *Jet engine noise, *Jet plane noise, Noise analyzers, Acoustics, Jet fighters, Boundary layer, Measurement, Pressure, Oscillation, Flight testing, Transonics.

Inflight noise measurements were made on an F-102A aircraft at speeds up to Mach 0.90 at 5000 feet and up to Mach 1.16 at 25,000 feet. Boundary layer pressure fluctuations were measured at seven positions on the aircraft using specially designed condenser microphones. The sensing plates of the microphones were mounted flush with the aircraft skin. Internal measurements were made at five positions using conventional condenser microphones. The measured sound pressure levels are discussed as functions of indicated air speed, octave bands, mach number, and altitude. The results show a wide variation in the dependence of sound pressure level on indicated air speed, the dependence varying between the 0.55th and the 4.9th power of the indicated air speed. A sharp drop in sound pressure level is observed at several positions as the aircraft passes through Mach 0.83. A spectrum shape change is observed as the aircraft reaches and passes through the vicinity of Mach 0.83, the peak of the spectrum being shifted to higher frequencies. There are also indications that the apparent noise reduction through the aircraft skin derived from these data is not constant but depends on both the indicated air speed and altitude. (Author)

AD-291 434 Div. 1
(TISTA/SEB) OTS price $4.60

Republic Aviation Corp., Farmingdale, N. Y.
TERRESTRIAL HYPERSONIC FLIGHT PROPULSION. PHASES I AND II,
by Kenneth M. Foreman. 1 Sep 62, 38p. incl. illus. tables, 18 refs. (Rept. no. RAC 964; PPL-TR-62-2)
Unclassified report

DESCRIPTORS: *Electric propulsion, *Hypersonics, *Hypervelocity vehicles, Military requirements, Energy, Drag, Boundary layer, Electromagnetic effects, Fuel injection, Afterburners, Feasibility studies, Velocity, High altitude, Thrust, Air, Hydrogen, Power supplies, Recombination ramjet engines, Ramjet engines, Flight, Ramjet propulsion.

Two detonative processes were studied for sustained hypersonic propulsion using the terrestrial atmosphere. The regimes of flight are defined, theoretical considerations of hypersonic flight energy requirements are indicated, and magnitudes are established for representative drag coefficients and fuel admixtures. The drag of hypersonic vehicles is estimated within a range of values depending on the type of boundary layer established and the relative cross-section areas of the inlet and exit stations. The energy released by the stationary and moving detonation processes is computed and compared with propulsion requirements. While the first process probably is limited to velocities no greater than 7000 to 8000 fps, the latter is applicable to the entire hypersonic flight corridor and will be limited only by the amount of supplemental energy available in the flight vehicle which can be used to drive and support the moving detonation. Several proposed hypersonic airbreathing propulsion system applications, including electrical augmentation, are evaluated. The required features of an airborne electrical power supply are specified. An electromagnetic fuel injection afterburner combined with a standing wave detonation device appears the most promising. (Author)

AD-291 486 Div. 1, 18
(TISTA/SEB) OTS price $1.10

Hughes Aircraft Co., Culver City, Calif.
CONTROL DATA REQUIREMENTS INVESTIGATION FOR OPTIMIZATION OF FUEL ON SUPERSONIC TRANSPORT VEHICLES.
Monthly progress rept. no. 4, 29 Oct-25 Nov 62. 26 Nov 62, 5p. incl. illus. (Rept. no. 62H-7508/9299)
(Contract AF 33(657)8822, Proj. 9056)
Unclassified report

DESCRIPTORS: *Transport planes, *Fuel consumption, Supersonic planes, Jet planes, Jet fighters, Operations research, Turbojet engines, Operation.

AD-291 718 Div. 1
(TISTP/JW) OTS price $1.60

RAND Corp., Santa Monica, Calif.
A THIN AIRFOIL WITH A MINIMUM AVERAGE COEFFICIENT OF HEAT TRANSFER FOR A GIVEN LIFT,
tr. by Joy B. Gazley. Nov 62, 15p. incl. illus. 5 refs. (Memo. no. RM-3410-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Airfoils, Translations, Heat transfer, Lift, Kinetic theory, Boundary layer, Fluid flow, Airplanes.

AD-291 743 Div. 1
(TISTA/FRL) OTS price $1.10

Aeronautical Structures Lab., Naval Air Material Center, Philadelphia, Pa.
STUDY OF THE FEASIBILITY OF A TURBULENT AIR SENSOR,
by J. H. Towle. 20 Dec 62, 4p. incl. illus.
(Rept. no. NAMC-ASL-1058)
Unclassified report

DESCRIPTORS: *Pitot tubes, *Transducers, Aircraft, Airspeed indicators, Design, Analysis, Turbulent flow, Pressure, Feasibility studies, Turbulence.

Based upon the results of a literature survey and theoretical analysis, it was determined that it is feasible to develop a turbulent air sensor. This sensor would be actuated by the fluctuations in the pitot system of an airplane caused by turbulence and would produce an electrical signal proportional to this disturbance. The feasibility of developing a turbulent air sensor has been demonstrated analytically; however, experimental confirmation during laboratory and flight tests is recommended. (Author)

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-291 203 Div. 2
(TISTP/FR) OTS price $8.60

Free U., Berlin (Germany).
PRELIMINARY DAILY NORTHERN HEMISPHERE 10-MILLIBAR SYNOPTIC WEATHER MAPS OF THE YEAR 1962. PART II. APRIL-JUNE.
Quarterly technical status rept. no. 2,
by Karin Labitzke-Behr, Zdravko Petkovsek, and Richard Scherhag. 1962, 1p. illus.
(Contract DA 91-591-EUC-2148)
Unclassified report

Original contains color plates; all ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: *Northern hemisphere, *Meteorological charts, Barometric pressure, Temperature, Wind, Stratosphere, Periodic variations.

AD-291 464 Div. 2
(TISTE/RD) OTS price $7.60

Woods Hole Oceanographic Institution, Mass.
DETECTING SEA WAVES BY THEIR DIFFRACTION OF A RADIO WAVE.
Technical rept.,
by Norman F. Barber. Sep 62, 70p. incl. illus.
(Ref. no. 62-39)
(Contract Nonr-335100)
Unclassified report

DESCRIPTORS: *Ocean waves, *Radio waves, Electronic circuits, Radio transmitters, Oceanography, Navigation, Detection, Diffraction.

Contents:
The diffraction process
Diffraction from a vertically polarized array
A transmitter at a finite distance
The airborne method
Gating pattern
Frequency sweep
Beating and doppler shift
The aerial
The electronic circuits

AD-291 491 Div. 2, 1
(TISTW/PCR) OTS price $4.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
HYPERVELOCITY MICRO-PARTICLE IMPACT ON THIN FOILS,
by L. G. Richards and J. W. Gehring, Jr. Feb 61, 47p. incl. illus. tables, 4 refs. (BRL technical note no. 1380)
(DA Proj. 503-04-011)
Unclassified report

DESCRIPTORS: *Foils, *Particles, *Hypervelocity projectiles, Meteorites, Simulation, Balloons, Tests, Test methods, Photographs, Impact shock.

Micrometeorite bombardment of thin foils was simulated by a ballistic method of projecting cast iron particles less than 100 microns in size to 12 km/sec. The Mylar and Testlar target foils tested were prospective balloon satellite materials. Bare and metal coated specimens, 0.5 and 2 mils thick, were included. Perforations were analysed by a photographic enlargement technique particularly adapted for complete survey of exposed target area without gaps or duplications. Statistical distributions of perforation diameters were obtained and matched with a similar distribution of the impacting fragments. Thus, the integrated impact intensity sustained by a particular target was determined. Results are reported in tabular form suitable for evaluation of changes in physical properties of the foils due to meteorite impact. These experimental methods are suitable for studies of impacts on simple metal foils. (Author)

AD-291 501 Div. 2, 15
(TISTP/FR) OTS price $4.60

Institute of Engineering Research, U. of Calif., Berkeley.
TABULATION OF ESTIMATED MEANS, VARIANCES, CROSS AND AUTO-COVARIANCES OF WINDS ALOFT FOR SOME SELECTED SEASONS AND LOCATIONS,
by C. L. Bisson and R. R. Read. 30 Oct 62, 4p. tables, 3 refs. (Rept. no. CDRP-182-109)
(Contract CD-SR-58-40)
Unclassified report

DESCRIPTORS: *Wind, *Statistical analysis, High altitude, Periodic variations, Statistical functions.

A tabulation by seasons is given of five year directional component means, variances, cross and auto-covariances for 15 pressure levels and time lags up to three days at Oakland, summer and winter; Washington, summer and winter; Ft. Worth, summer and winter; Ely, autumn; Dodge City, winter; Hilo, spring. (Author)

AD-291 508 Div. 2
(TISTP/FR) OTS price $3.60

DECO Electronics, Inc., Boulder, Colo.
NATURAL NOISE FIELDS FROM 1 C/S TO 100 KC/S,
by E. L. Maxwell and D. L. Stone. 26 Nov 62, 26p, incl. illus. 10 refs. (Rept. no. 30-P-3)
(Contract Nonr-338700, Proj. NR 371-590)
Unclassified report

DESCRIPTORS: *Electric fields, *Magnetic fields, *Very low frequency, *Periodic variations, *Extremely low frequency, Measurement, Instrumentation, Tables.

Vertical electric and horizontal magnetic rms noise field intensities were measured over the frequency range of 30 to 50,000 cps for all seasons of the year and for all time blocks. This data is combined with that of other workers in the field to present the natural noise density spectra from 1 cps to 100 kc for central United States regions. Seasonal and diurnal variations at these locations are seen to become small below 1 kc. In addition to rms data, measurements were made of the peak envelope occurring within 5-minute time intervals in a 7 cps bandwidth. Under certain conditions, rapid changes in the rms to peak envelope dynamic range were noted between 3 and 8 kc. These phenomena are discussed with respect to source characteristics and propagation. (Author)

AD-291 515 Div. 2
(TISTP/FR) OTS price $12.50

Florida U. Engineering and Industrial Experimental Station, Gainesville.
STUDY OF THE PROPAGATION AND DISSIPATION OF ''ELASTIC'' WAVE ENERGY IN GRANULAR SOILS,
by F. E. Richart, Jr., J. R. Hall, Jr., and J. Lysmer. Sep 62, 173p. incl. illus. table, refs.
(Contract DA 22-079-eng-314)
Unclassified report

DESCRIPTORS: *Soils, *Sand, *Wave transmission, Damping, Oscillation, Stresses, Pressure, Creep, Velocity, Measurement, Instrument.

Laboratory tests were conducted on selected granular materials to determine the velocities of propagation of the shear and compression waves and to evaluate the internal damping. Test variables included the confining pressure, amplitude of vibration, void ratio of the material, saturation, and grain size. Resonant column tests were used for wave velocity evaluation, and the vibration decay method and static torsion tests were used to determine damping. The granular materials used were Ottawa standard sand, two sizes of glass spheres, and a crushed quartz. (Author)

AD-291 563 Div. 2
(TISTP/JW) OTS price $1.60

Kaysam Corp. of America, Paterson, N. J.
PRODUCTION ENGINEERING MEASURE FOR MANUFACTURE OF METEOROLOGICAL BALLOONS TYPE ML-541( )/UM.
Quarterly progress rept. no. 2, 19 July-18 Oct 62,
by Murray Miner, ed. by John Kantor. 18 Oct 62, 14p.
(Contract DA 36-039-sc-85988)
Unclassified report

DESCRIPTORS: *Meteorological balloons, Production, Test methods, Design, Manufacturing methods.

The study of hand techniques for the assembly of head to tail balloons was continued. A method for joining two inflated balloons axially was examined. The cone-edged ring method discussed in the previous quarterly report was reviewed, and experiments were conducted with tails which were reinforced as well as with tails which were not reinforced. Balloons made from modified forms were employed in experiments for joining the head to the tail balloon. The basic types of automatic dipping machines which were examined included a twin-chain conveyor, a one-cylinder turntable, a six-cylinder turntable, and a continuous-chain conveyor. A balloon assembly machine based on the cone-edged ring method of assembly was proposed. Some design considerations were examined on the basis of the evaluation of hand techniques. (Author)

AD-291 590 Div. 2
(TISTP/JW) OTS price $3.60

Stanford Research Inst., Menlo Park, Calif.
PERFORMANCE OF TROPOSPHERIC SCATTER SYSTEMS AS A FUNCTION OF WEATHER CONDITIONS.
Final technical rept. no. 5,
by Arnett S. Dennis. June 61, 32p. incl. illus. tables, 22 refs.
(Contract DA 36-039-sc-85052)
Unclassified report

DESCRIPTORS: *Meteorological data, *Scattering, Refractive properties, Radio wave, Climatic factors, Very high frequency, Weather forecasting, Transmission, Signals.

Previous studies have shown that signal levels on tropospheric scatter links are related to weather conditions along the path. It was found that monthly median signals are correlated with radio refractivity gradients near the ground. Thus, climatological data can be used to improve estimates of basic transmission loss for projected scatter links. The correlations of hourly median signals with refractivity gradients and the surface refractivity are investigated for an over-water and a coastal path and found to be significant. This indicates that short-range forecasts of scatter-circuit performance over water and some coastal areas can be made using routinely available meteorological data. The question of extending the STARCOM network in the western Pacific using tropospheric scatter links is discussed briefly in the light of these considerations. The possibility of jamming scatter links is examined in a separate appendix (classified). (Author)

AD-291 670 Div. 2
(TISTP/JW) OTS price $1.60

Georgetown Coll. Observatory, Washington, D. C.
RESEARCH DIRECTED TOWARD GEODETIC MEASUREMENTS BY OBSERVATIONS OF SOLAR ECLIPSES.
Final rept.,
by Francis J. Heyden, A. Baldini, and O. Mattingly. Nov 61, 11p.
(Contract AF 19(604)2229, Proj. 7600)
(AFCRL 62-1017) Unclassified report

DESCRIPTORS: *Solar eclipse, *Geodesics, Instrumentation, Photoelectric effect, Photographic recording techniques, Data processing systems, Measurement, Geodetic astronomy.

Methods of obtaining and effecting reduction of data to apply to geodetic measurements from total and annular eclipses are described, with information on development of photographic and photo-electric observation techniques. A new method of reduction of photographic observation data, (which does not include information on contact times, but which should yield accurate relative positions between observers) was utilized to determine distances and azimuths between eclipse sites. Employment of a new set of accurate limb-tracings of photographic derivation to obtain limb-correction data proved successful. Digitizing of the equipment utilized in measuring the periphery of crescent images of the partially-eclipsed sun is described briefly.

Application of a Burroughs E101 increased accuracy of the reduction work and permitted effective use of eleven decimal places. Accuracy and speed of measurements of the solar eclipse photographs was improved by installation of a projection reader, which was introduced to the digitizing system. (Author)

AD-291 679 Div. 2
(TISTP/GRW) OTS price $2.60

Air Force Cambridge Research Labs., Bedford, Mass.
SUPPLEMENTAL ATMOSPHERES,
by A. Court, A. J. Kantor, and A. E. Cole.
Sep 62, 21p. incl. illus. tables, 51 refs. (Rept. no. AFCRL 62-899)
(Proj. 8624)
Unclassified report

DESCRIPTORS: *Atmosphere models, Stratosphere, Meteorological data, Tables, Tropical regions, Standards.

Atmospheres typical of the tropics (15 degrees N), sub-tropics (30 degrees N), and mid-latitudes (45 degrees N) were prepared as members of a family of atmospheres supplemental to the 1962 US Standard Atmosphere; they provide information on latitudinal and seasonal changes in atmospheric structure up to 90 km. Temperature gradients for various segments are linear with geopotential height. Humidity is incorporated into the lowermost 10 km of each atmosphere. Figures and tables depict temperature, relative humidity, pressure, and density. The atmospheres are mutually consistent; zonal wind profiles computed from the geostrophic wind equation at selected pressure heights compare favorably with existing rawinsonde and Meteorological Rocket Network wind observations. (Author)

AD-291 686 Div. 2
(TISTP/GRW) OTS price $1.60

Massachusetts Inst. of Tech., Cambridge.
BASIC RESEARCH ON ICE AND SNOW.
Final rept.,
by W. D. Kingery and C. M. Adams, Jr. 14 Nov 62, 8p.
(Contract AF 19(604)5994, Proj. 8623)
(AFCRL-62-1080) Unclassified report

DESCRIPTORS: *Snow, *Ice, *Crystal structure, Tensile properties, Mechanical properties, Surface properties, Oxygen, Diffusion.

Research results are described related to snow communition and metamorphism, sea ice solidification, mechanical properties of ice, surface characteristics of ice, salt migration in sea ice, and oxygen diffusion in ice. (Author)

AD-291 755 Div. 2
(TISTP/JW) OTS price $4.60

Air Force Cambridge Research Labs., Bedford, Mass.
RADIO MEASUREMENTS OF TWO TOTAL ECLIPSES,
by John P. Castelli, Helen W. Cohen and others.
Aug 62, 37p. incl. illus. 7 refs. (Rept. no. AFCRL 62-852)
Unclassified report

DESCRIPTORS: *Solar eclipse, Measurement, Moon, Brightness, Energy, Radio ranges.

Multi-frequency records of two total eclipses of the sun -- October 2, 1959 and February 15, 1961 -- have been analyzed. The position of the moon's limb during increases and decreases of the slopes of the eclipse curve was compared with optical maps and radio heliograms in an attempt to study the bright radio regions on the sun. Angular diameters of a few enhanced regions were found to vary between 0.75 and 1.25 minutes of arc. The brightness temperature of one region was 1.5 x 10 to the 5th power degrees K at 9700 mc and 9 x 10 to the 5th power degrees K at 1270 mc. The heights of emitting regions at various frequencies were calculated in two cases. No conclusions as to limb brightening could be reached because of the presence of enhanced radio regions near both limbs during both eclipses. The residual energy at totality on October 2 was approximately 20% at both 1300 and 3000 mc; on February 15, it was 8.6% at 9700 mc and 25.3% at 1270 mc. (Author)

AD-291 775 Div. 2
(TISTB/DGH) OTS price $8.10

Imperial Coll. of Science and Tech., London (Gt. Brit.).
THE VERTICAL DISTRIBUTION OF ATMOSPHERIC OZONE BY METHODS OF INFRA-RED SPECTROGRAPHY AND RELATED PROBLEM OF THE ATMOSPHERIC CONTINUUM.
Technical rept.,
by J. V. Dave, P. A. Sheppard, and C. D. Walshaw.
July 62, 77p. incl. illus. tables, 11 refs.
(Grant AF EOAR 61-14)
(AFCRL 62-1060) Unclassified report

DESCRIPTORS: *Ozone, Spectrographic analysis, Atmosphere, Tables, Measurement, Determination, Infrared spectroscopy.

High resolution (205/cm) observations of atmospheric emission in and just outside the 9.6 micron ozone band have been made over 2 yrs near London. They show (1) that continuum absorption is increased above that due to water vapor by (low-level) haze and, (2) that vertical distributions of ozone as inferred are subject to error from continuum variation and from uncertainty in the ozone transmission function. (Author)

AD-291 785 Div. 2, 20
(TISTP/TL) OTS price $2.60

Queen's U., Belfast (Gt. Brit.).
HELIUM IONS IN THE UPPER ATMOSPHERE,
by D. R. Bates and T. N. L. Patterson. 1962, 26p. incl. illus. table, 12 refs.
(Grant no. AF-EOARDC 61-16)
(AFCRL 62-1119)
Unclassified report

DESCRIPTORS: *Upper atmosphere, *Helium, *Ions, *Atoms, Oxygen, Nitrogen, Dissociation, Recombination reactions, Atmosphere models.

Reasons are given for believing that ion-atom interchange between He(+) and N2 is strongly endothermic but that ion-atom interchange between He(+)and O2 is exothermic. It is concluded that the former ion-atom interchange process does not occur to an appreciable extent but that the latter may be responsible for the removal of the He(+) being produced by photoionization. Calculations are carried out on the steady state. In harmony with the prediction of Nicolet He(+) is found to be abundant at great altitudes even if a high rate coefficient is assigned to the collision process leading to its removal. Attention is drawn to the possibility that dissociative recombination of HeO(+) is important in connection with the problem of the escape of helium into interplanetary space. (Author)

AD-291 790 Div. 2
(TISTP/JW) OTS price $4.60

Navy Electronics Lab., San Diego, Calif.
MEASUREMENTS OF THERMAL STRUCTURE OFF SOUTHERN CALIFORNIA WITH THE NEL THERMISTOR CHAIN.
Research rept.,
by E. C. LaFond and A. T. Moore. 28 Aug 62,
46p. incl. illus. 20 refs. (NEL rept. no. 1130)
Unclassified report

DESCRIPTORS: *Thermistors, *Underwater, Thermal stresses, California, Temperature, Ocean waves, Frequency, Oceanography, Measurement, Analysis.

Oceanographic factors pertinent to the behavior of underwater sound and to surface and subsurface navigation were investigated. The average slopes, autocorrelation, and power spectra of the isotherms obtained with the NEL thermistor chain on the different legs of a deep-water cruise show that many internal waves are of very long period. The spectra appear to be continuous at very low frequencies and to possess minor peaks at higher frequencies. The records of circular tows with the chain establish that the thermal structure is complex. Although the circular paths followed were too small to clearly demonstrate significant motion in any particular direction, the data obtained do reveal that wave crests and troughs of a generally similar type were crossed in all directions of tow. Recommendations are: (1) continue development of the thermistor chain to improve the quality, accuracy, and reliability of the data; (2) make detailed studies of the thermocline and its associated internal waves by use of the chain, which includes studies of the effects on the thermocline of islands, shoals, coastal configurations, tides, currents, upwelling, river runoff, water mass boundaries, storms, and seasons; and (3) procure electronic equipment to provide digital tape records of temperature-depth or isotherm-depth data and still retain the present analog recording system. (Author)

AD-291 793 Div. 2
(TISTP/JW) OTS price $7.60

New York U. Coll. of Engineering, N. Y.
THE WIND SPECTRA OF THE TROPOSPHERE AND LOWER STRATOSPHERE OVER NORTH AMERICA,
by Wan-Cheng Chiu. Sep 62, 68p. incl. illus. tables, 8 refs. (Scientific rept. no. 5)
(Contract AF 19(604)6146, Proj. 8645)
(AFCRL 62-1022)
Unclassified report

DESCRIPTORS: *Wind, *Weather forecasting, North America, Central America, Weather stations, Stratosphere, Frequency, Kinetic theory, Motion, Energy.

The energy- and cross-spectra of the west-east wind components and the south-north wind components were computed at several levels extending from the 950 mb level to the 50 mb level at eleven North and Central American stations and one Pacific station. It was found that the spectral intensity of the kinetic energy in general decreases with increasing frequency, that the transport of angular momentum is northward at the majority of stations, and that this transport is strongest at the 300 mb and 200 mb levels, and is carried out mostly by the low frequency fluctuations of the motion. (Author)

AD-291 843 Div. 2
(TISTP/JW) OTS price $4.60

McGill U. (Canada).
INSOLATION AND ABSORBED SOLAR RADIATION AT THE GROUND IN THE ARCTIC,
by E. Vowinckel and Svenn Orvig. Oct 62, 1v. incl. illus. tables, 22 refs. (Publication in Meteorology no. 53; Scientific rept. no. 5)
(Contract AF 19(604)7415, Proj. no. 8623)
(AFCRL 62-1068) Unclassified report

DESCRIPTORS: *Solar energy, *Absorption, Clouds, Wave characteristics, Radiation effects, Energy, Ground effect, Climatic factor, Arctic regions.

The present report forms part of a study of the heat balance of the Arctic. Short wave radiation is one of the main sources of energy, and its contribution to the energy balance will depend both on the cloud amount and type as well as on the characteristics of the ground surface. Previous studies have examined separately the albedo of arctic surfaces, cloud conditions over the Arctic, and the relation between insolation and cloud type. The present report presents the net results of the various studies previously completed. (Author)

AD-291 875 Div. 2, 16
(TISTB/MS) OTS price $11.00

Pacific Science Board, National Research Council, Washington, D. C.
ATOLL RESEARCH BULLETIN NOS. 88-94.
15 Dec 62, 1v. incl. illus. tables, refs.
(Contract N7onr-230012)
Unclassified report

DESCRIPTORS: *Pacific islands, *Coral reefs, Plants, Soils, Animals, Rock, Climate, Algae.

Contents:
Coral Islands, by Charles Darwin, with introduction, map, and remarks by D. R. Stoddart
Geophysical observations on Christmas Island
Plants of Christmas Island
Central subsidence: a new theory of atoll formation
Vascular plants recorded from Jaluit Atoll
A brief study of the cays of Arrecife Alacran
Atoll news and comments

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

AD-291 225 Div. 3
(TISTB/SAT) OTS price $1.10

Hazleton Labs., Inc., Falls Church, Va.
(No title).
Progress rept. no. 30.
1 Dec 62, 7p. incl. tables.
(Contract DA 18-108-405-cml-826)
Unclassified report

DESCRIPTORS: *Chemical warfare agents, Toxicity, Skin, Scopolamine, Exercise, Visual acuity, Laboratory animals.

4. CHEMISTRY

AD-291 240 Div. 4
(TISTM/TCG) OTS price $1.60

Wales U. (Gt. Brit.).
REACTIONS RELATED TO OXIDATION.
Final technical rept.,
by F. P. Herbert, P. T. Hinde and others.
28 Sep 62, 15p. incl. tables (Rept. no. FTR 1)
(Contract DA 91-591-EUC-1838; Continuation of Contract DA 91-591-EUC-1558)
Unclassified report

DESCRIPTORS: *Hydrocarbons, *Oxidation, *Reaction kinetics, Ethanes, Butanes, Pentanes, Propanes, Propenes, Ethylenes, Butenes, Photochemical reactions, Energy, Methyl radicals, Hydroxides, Photolysis.

Studies were directed toward measurement of the relative rates of the chain carrying reactions. First the consumption of hydrocarbons was studied under normal conditions of low temperature oxidation. This established the characteristic rates for an oxidation system. It was later found possible to obtain very similar behaviour at much lower temperatures when the reactions were initiated photolytically. Second the consumption of hydrocarbons was studied in systems in which the nature of the attacking radicals was known with reasonable certainty. The oxidations of alkanes were studied first. One of the principle features of work under the present contract was extension of the investigations to alkenes. The competitive oxidations of hydrocarbons were studied between about 270 and 490 C by introducing mixtures containing 3 to 10 cc of each hydrocarbon together with a large excess of oxygen into a reaction vessel. Occasionally an initiator was introduced to accelerate the reaction. Tests showed that its presence did not affect the results. It was found with several alkane mixtures that k sub 1/k sub 2 varied with its O content. Extrapolations were then made to zero oxygen pressure. (Author)

AD-291 243 Div. 4, 25, 17
(TISTM/BRW) OTS price $1.10

Oklahoma U., Research Inst., Norman.
THE INFLUENCE OF SOLID STATE DISLOCATIONS UPON THE CATALYTIC ACTIVITY OF METALS,
by T. D. Perkins, C. M. Sliepcevich and W. R. Upthegrove. 15 Nov 62, 4p. ref. (Technical rept. no. 3)
(Contract Nonr-98208, Proj. NR 051-418)
Unclassified report

DESCRIPTORS: *Single crystals, *Silver, Crystal structure, Lattices, Deformation, Catalysts, Electrochemistry, Reaction kinetics, Catalysts, Chemical reactions, Formic acids, Decomposition, High temperature research, Low pressure research, Catalysis.

Formic acid decomposition rates were measured at two temperatures, 370 and 350 F and over a pressure range of 20 to 70 mm Hg. No systematic variation in rate with change in dislocation density was found. In the electrochemical cell hydrogen deposition per unit superficial surface area of silver has shown a systematic increase with increasing dislocation density. Here the metal is immersed in sulfuric acid solution and protected against trace impurities of oxygen, etc., as shown by the potential existing between the platinum and silver electrodes. Furthermore, initial rates, i.e., those for the first fraction of a second, may be measured with some degree of precision. It would appear therefore that the influence of dislocations upon metallic properties is not one of significant magnitude to be determined with precision using the formic acid decomposition as a vehicle, especially where the metal is exposed to trace impurities and initial rates are most important. (Author)

AD-291 423 Div. 4, 30
(TISTM/REB) OTS price $3.60

Cornell U. Graduate School of Aeronautical Engineering, Ithaca, N. Y.
STUDIES WITH A SINGLE PULSE SHOCK TUBE. I. THE CIS-TRANS ISOMERIZATION OF BUTENE-2.
Technical rept.,
by E. L. Resler, Jr., S. H. Bauer, and Assa Lifshitz. Oct 62, 1v. incl. illus. tables.
(Rept. no. CU-7356)
(Contract AF 49(638)716)
Unclassified report

DESCRIPTORS: *Butenes, *Molecular isomerism, Shock tubes, Design, High temperature research.

The cis-trans isomerization of butene-2 was investigated behind reflected shocks in a single pulse shock tube of a novel design. The temperature range covered was 1000-1250 K and concentrations of 1% and 6% of the butene in A were used. Analyses were made by vapor phase chromatography. The first order rate constants obtained in this work fall slightly above the extrapolated Arrhenius curves of two recent low temperature studies. An activation energy of 65, rather than 62.8 kcal/mole, is obtained when a straight line is drawn between the high and the low temperature data. The rate constant obtained is 3.5 x 10 to the 14th power exp(-65 x 1000/RT). Possible sources of errors in evaluating reaction times in the single pulse shock tube are discussed. (Author)

AD-291 463 Div. 4, 30, 45
(TISTP/MAK) OTS price $8.60

Space Technology Labs., Inc., Los Angeles, Calif.
RESEARCH ON LOW TEMPERATURE COMPUTING ELEMENTS.
Annual summary rept., 30 Sep 61-30 Sep 62,
by A. J. Learn, H. T. Mann and others. 30 Sep 62, 95p. incl. illus. tables, refs. (Rept. no. 8971-6004-RU-000)
(Contract Nonr-254200)
Unclassified report

DESCRIPTORS: *Cryogenics, *Thin films, *Memory devices, *Low temperature research, Metal films, Polymers, Dielectric films.

A review is given of progress on STL's program of research on superconducting computing devices for the 12-month period ending September 30, 1962, except for that research on cryogenic associative memory structures which will be summarized in the annual report on contract Nonr-3839(00). Included in this report is research in the areas of metallic film formation, polymer dielectric film properties, and cryotron studies. (Author)

AD-291 689 Div. 4
(TISTM/RGR) OTS price $2.60

Milan U., (Italy).
OXYGEN AND HYDROGEN PEROXIDE ELECTROCHEMICAL BEHAVIOUR ON COPPER ELECTRODES,
by G. Bianchi, G. Caprioglio, and T. Mussini.

Jan 62, 12p. illus. 9 refs. (Technical note no. 7)
(Contract AF 61(052)260)
(AFOSR-2051) Unclassified report

DESCRIPTORS: *Electrochemistry, *Electrodes, *Oxygen, *Hydrogen compounds, Copper, Peroxides.

Oxygen cathodic reduction on Cu has been investigated in acid, neutral and alkaline solutions, together with the parallel process of H202 cathodic reduction. Two reaction mechanisms have been outlined: the former involving Cu compounds and the latter involving the depolarization of atomic hydrogen formed at the Cu surface owing to cathodic polarization. This process may be compared with the similar one observed when Au is concerned. (Author)

AD-291 763 Div. 4
(TISTM/ODN) OTS price $1.60

Pennsylvania U., Philadelphia.
REVERSIBLE OXYGEN ELECTRODES.
Quarterly rept. no. 3, 1 May-31 July 62,
by M. A. V. Devanathan and M. L. Bhaskara Rao.
31 July 62, 14p. illus.
(Contract DA 36-039-sc-88921)
Unclassified report

DESCRIPTORS: *Oxygen electrodes, *Electrodes, *Electrolytic cells, *Adsorption, Fuel cells, Gases, Pressure, Electrochemistry, Wet cells, Reaction kinetics, Platinum, Electric potential, Sulfuric acid, Oxidation-reduction reactions.

Adsorption of oxygen on oxide free Pt surfaces was studied in 1N H_2SO_4. Galvanostatic transient technique was employed to determine O coverage. The rest potential of the electrode was found to depend on O coverage, the latter in turn was determined by equilibrium partial pressure of the gas in solution. The behavior of O at the Pt electrode was found to follow a Langmuir type isotherm for dissociated adsorption. (Author)

AD-291 801 Div. 4
(TISTM/REB) OTS price $6.60

Regis Chemical Co., Chicago, Ill.
THE SYNTHESIS OF NON-COMMERCIALLY AVAILABLE ORGANIC CHEMICALS.
Annual technical rept., 15 June 61-31 Aug 62,
by Louis J. Glunz, Charles Feit and others.
25 Sep 62, 64p. incl. illus. refs.
(Contract DA 18-108-cml-6625)
Unclassified report

DESCRIPTORS: *Organic compounds, *Pyrroles, *Quinolines, *Quinoxalines, *Heterocyclic compounds, *Polycyclic compounds, Carboxylic acids, Esters, Alcohols, Synthesis.

The following compounds were prepared: (1) methyl beta-naphthyl carbonate; (2) 3-beta-granatanol; (3) 3-alpha-granatanol; (4) tropine: (5) pseudotropine: (6) 1-hydroxypyrrolizidine: (7) 3-ketoquinolizidine: (8) 3-oxo-1-azabicyclo(3.3.1)nonane: (9) 2-keto-octahydro-pyrrocoline: (10) 2-ketoquinolizidine: (11) 1-ketopyrrolizidine; and (12) 8-keto-octahydro-pyrrocoline. Progress toward the synthesis of the following compounds is also reported: (1) 2-ketopyrrolizidine; (2) 7-keto-octahydro-pyrrocoline; and (3) ethyl 3-pyrrolidine-carboxylate. (Author)

AD-291 813 Div. 4, 10
(TISTM/REB) OTS price $1.60

Army Chemical Corps, Army Chemical Center, Md.
A TEST SERIES CONDUCTED TO DETERMINE THE FEASIBILITY OF USING WATER FOG OR A THERMAL UPDRAFT TO CONTROL OR DISPERSE THE FUMES RESULTING FROM SPILLS OR NITROGEN TETROXIDE.
Nov 62, 12p. incl. tables.
(Contract AF 33(616)10-20, Proj. 8119)
(SSD TDR 62-177) Unclassified report

DESCRIPTORS: *Nitrogen compounds, *Tetroxides, *Dioxides, *Liquid rocket propellants, *Poisonous gases, Feasibility studies, Test methods, Storage, Hazards, Solvent action, Water, Solubility, Heat, Air, Disposal, Decontamination, Control.

Different methods of preventing large, concentrated clouds of nitrogen dioxide (NO_2) from traveling for extended distances at ground level were tested and evaluated. These clouds of NO_2 are the fumes which are generated from spills of nitrogen tetroxide (N_2O_4). Since these tests were designed as a feasibility study only, no attempt was made to collect data; therefore, the results described in this report are strictly qualitative. (Author)

AD-291 846 Div. 4, 14
(TISTM/REB) OTS price $4.60

General Electric Co., Schenectady, N. Y.
SYNTHESIS AND EVALUATION OF THERMALLY STABLE POLYMERS. PHASE I. POLYMER SYNTHESIS. PHASE II. POLYMER EVALUATION.
Progress rept. no. 8, July-Sep 62 on Non-metallic and Composite Materials,
by G. P. Brown, A. Goldman, and Charles D. Doyle.
15 Sep 62, 42p. incl. illus. tables, 3 refs.
(Contract AF 33(616)7076, Proj. 7340)
Unclassified report

DESCRIPTORS: *Heat resistant polymers, *Composite materials, Phenoxy radicals, Polymerization, Potassium compounds, Polymers, Synthesis.

Decreasing the quantity of Nujol and of phenylcyclohexane in the polymerization of potassium m-halophenoxide has been shown to provide somewhat higher molecular weights. The effects of surface treatment, particle size and quantity of catalyst on the polymerization have been investigated. The results are interpreted as indicating important roles for each of these variables with surface contaminants indicated as the major variable influencing the catalytic activity. MSR test results are given for comparison with findings at Wright Field. Attempts to mold small mechanical-test bars are described. Three-point flexural test and vibrating reed test formulae are considered with regard to their use with small test bars. (Author)

AD-291 858 Div. 4, 14
(TISTM/REB) OTS price $1.25

Rock Island Arsenal Lab., Ill.
POLYMERIZATION WITHIN CELLULOSE MATRICES. PART I: THE EXCHANGE REACTION BETWEEN CALCIUM AND CARBOXYL GROUPS IN CELLULOSE. PART II: NATURE OF THE STRENGTH REINFORCEMENT,
by E. S. Putnam. 12 Feb 62, 36p. incl. illus. tables, 82 refs. (Rept. no. 62-554)
(DA Proj. no. 599-25-001)
Unclassified report

DESCRIPTORS: *Cellulose, *Polymerization, *Exchange reactions, *Calcium, *Ion exchange, *Cellulose acetates, *Wood pulp, Carboxylic acids, Calcium compounds, Acetates, Tritiated compounds, Food pulp fibers, Free radicals.

The exchange reaction between calcium ions and the carboxy groups on International Committee for Cellulose Analysis pulps, was investigated, using tritiated calcium acetate. Acetate ion was retained in varying amounts by all pulps indicating that monovalent as well as divalent exchange reactions take place when the salts of weak acids are passed through cellulose pulps. Two relationships were established: (1) a direct relationship between the number of oxidized (carboxyl and aldehyde) groups and the number of acid soluble pentose units in each pulp, (2) an inverse relationship between the sum of the number of acid soluble pentose and alkali soluble glucose units per oxidized group and the degree of polymerization of each pulp. It was found that the strength reinforcement resulting from polymerization of monomers in non swelling solvents in the presence of a cellulose matrix was lost with the extractable polymer. The rheological behavior of the treated material indicates that the strength reinforcement is due to additional hydrogen bonds formed between the polymer and the cellulose fiber matrix. (Author)

5. COMMUNICATIONS

AD-291 207 Div. 5
(TISTW/DLW) OTS price $9.10

Martin-Marietta Corp., Orlando, Fla.
RACEP PROTOTYPE EQUIPMENT.
Final rept.
Dec 62, 95p. incl. illus. tables, 9 refs. (Rept. no. OR 2495-1)
(Contract AF 19(604)8511)
(AFCRL 62-767) Unclassified report

DESCRIPTORS: *Radio communication systems, *Voice communication systems, *Secret communication systems, Very high frequency, Broadband, Coding, Walkie-talkies, Radio equipment, Telephone communication systems, Design, Tests, Mobile, Digital systems.

The RACEP discrete address system is a portable communications system that provides telephone-type service without wires or switching centrals. It is a broadband system in which voice is converted to coded pulse groups in a time-frequency matrix, and then processed for transmission in the VHF region. The receiver reconstructs the voice message by converting the received information pulses into conventional audio signals. Technical characteristics and operating controls are presented for each of the units. Laboratory and field test results are also included. (Author)

AD-291 213 Div. 5
(TISTW/RD) OTS price $4.60

North Electric Co., Galion, Ohio.
STUDY OF AUTOMATIC ROUTING IN A SWITCHED SYSTEM UTILIZING SATURATION SIGNALING.
Quarterly rept. no. 1, 1 July-1 Sep 62,
by Y. S. Fu, H. Hambrock and others. 1 Sep 62, 28p. incl. illus. tables, 12 refs.
(Contract DA 36-039-sc-90824)
Unclassified report

DESCRIPTORS: *Telephone communication systems, *Telephone signals, Digital computers, Programming, Computer logic, Probability, Statistical analysis, Switches, Switching circuits, Simulation.

A study is presented of automatic routing in a switched system utilizing saturation signaling. Presented are: progress of a computer simulation of network configurations, methods of analyzing results of these simulations, proposed mechanization of the system, and the direction the final half of the study will take. (Author)

AD-291 231 Div. 5
(TISTW/DLW) OTS price $3.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
MICROWAVE CROSS SECTION OF THIN DIPOLES,
by C. L. Mack, Jr. 15 Nov 62, 31p. incl. illus. tables, 18 refs. (Rept. no. 36G-2)
(Contract AF 19(628)500)
(AFESD TDR 62-243) Unclassified report

DESCRIPTORS: *Radio communication systems, *Reflectors, *Radar echo areas, *Electromagnetic wave reflections, *Microwave communication systems, Satellite vehicles, Measurement, Tin, Dielectrics, Test methods, Orbital flight paths, Scattering, Dipole antennas.

Efficient electromagnetic scatterers were sought for a passive satellite communication system. Attempts to elongate short dipoles into half-wave resonance are reported, as well as cross-section measurements of various other scatterers. A short but rigorous method of calculating the skin impedance of straight, cylindrical wire is given, along with a method of approximating the backscattering cross section of half-wave dipoles cut from such wire. Scattering measurements of tin dipoles during phase transformation are reported. (Author)

AD-291 740 Div. 5, 28, 30
(TISTE/OHD) OTS price $1.10

Air Force Cambridge Research Labs., Bedford, Mass.
SPEECH COMPRESSION STUDIES,
by Caldwell P. Smith. Sep 62, 8p. incl. illus. 6 refs. (Rept. no. AFCRL 62-739)
(Proj. 4610)
Unclassified report

Presented at the 1962 Northeast Electronics Research and Engineering Meeting (NEREM), Boston, Mass.

DESCRIPTORS: *Speech, *Speech representation, *Speech transmission, *Voice communication systems, Audiofrequency, Radiofrequency spectrum analyzers, Digital systems, Analog-to-digital converters, Multiplex transmission, Coding.

Studies of speech signal structure, and of listener responses to modified and standardized speech signals, are being performed with a special-purpose speech analysis/synthesis facility. The facilities and some findings are discussed. (Author)

AD-291 762 Div. 5, 8, 23
(TISTE/OHD) OTS price $13.50

DuMont, Allen B., Labs., Inc., Clifton, N. J.
STUDY OF TELEVISION MULTIPLE INSERTION TECHNIQUES.

Final engineering rept.,
by Eric Herud. 25 Oct 57, rev. 1 Aug 62, 193p. incl. illus. tables.
(Contract N61339-90)
(NAVTRADEVCEN 90-1) Unclassified report

DESCRIPTORS: *Military training, *Training devices, *Television display systems, Triggered gates, Trigger circuits, Electronic circuits, Switching circuits, Wiring diagrams, Automation, Iconoscopes, Film projectors, Video signals.

Effort was made to explore the technique of television image presentation in general and specifically to examine certain problems pertinent in the solution of training problems. In this study the means of combining several moving images to form a composite picture, within a common background, is reported. Video insertion in itself is not new, but the method developed in this study is. Five separate targets may be included at the same time. These targets have the capability of moving independently of each other. Additional data has also been collected on general systems considerations, pickup and display devices, and equipment recommendations. (Author)

AD-291 799 Div. 5
(TISTB/LMH) OTS price $11.00

Royal Inst. of Tech. (Sweden).
SPEECH ANALYSIS TECHNIQUES.
Final technical rept., 1 July 60-30 June 62,
by Gunnar Fant and Arne Risberg. 30 June 62, 143p. incl. illus. tables, refs. (Rept. no. 8)
(Contract DA 91-591-EUC-1496)
Unclassified report

DESCRIPTORS: *Speech, *Voice communication systems, Speech representation, Speech transmission, Tracking, Spectrographic analysis, Acoustics, Audiofrequency, Data processing systems, Radio communication systems, Analog-to-digital converters, Intelligibility, Factor analysis.

Methods are studied for processing speech signals such that the bandwidth requirements for the transmission and reception of such signals are markedly reduced and voice intelligibility and quality are retained. These studies comprise theoretical and experimental investigations of speech analysis and synthesis in order to study methodological problems and to construct complete instrumentation. (Author)

AD-291 892 Div. 5, 6, 8
(TISTW/PCR) OTS price $2.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
EXPERIMENTAL EVALUATION OF AN OPTIMUM DETECTOR FOR FSK TRANSMISSION THROUGH A RAYLEIGH FADING CHANNEL,
by Edward E. Cossette and Jack K. Wolf. Nov 62, 22p. incl. illus. 6 refs. (Rept. no. RADC TDR 62-554)
(Proj. 4519)
Unclassified report

DESCRIPTORS: *Radio receivers, *Radio transmission, Radio signals, Noise (Radio), Simulation, Errors, Signal-to-noise ratio, Data processing systems, Radiofrequency filters, Wiring diagrams, Radio equipment, Radio reception, Data transmission systems, Frequency shift.

The results of an analysis were used to specify an optimum receiver for the reception of frequency-shift-keyed signals which experience Rayleigh fading and additive Gaussian white receiver noise. This receiver was instrumented, through use of simulation techniques, to evaluate experimentally the performance of such a system. The measurements resulted in a family of curves giving the probability of transmission error as a function of the ratio of signal energy per bit to noise power density with the keying interval as a parameter. The results showed an improvement over existing FSK receivers. (Author)

6. DETECTION

AD-291 441 Div. 6, 16
(TISTE/AW) OTS price $2.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
MEASUREMENT OF NEUTRON ACTIVITY BY PARAMAGNETIC RESONANCE,
by Michael A. Kelly. 9 Nov 62, 18p. incl. illus. 9 refs. (Research rept. no. PIBMRI-1071-62)
(Contract AF 18(600)1505 and Grant AF-AFOSR-62-295)
Unclassified report

DESCRIPTORS: *Nervous system, *Brain, *Spinal cord, *Paramagnetic resonance, *Nerves, Measurement, Direct current, Circuits, Detectors, Free radicals, Neurology, Cells (Biology).

A theory for measuring neuron activity at any desired location in a living animal by a technique that requires no physical contact between the subject and the detector is presented. The theory postulates that free radicals are produced in the formation of neuron action potentials, and that the concentration of these free radicals can be measured by magnetic resonance techniques. A device to test these postulates has been built, but does not yet possess the sensitivity needed to give the theory a meaningful test. The design and construction of this device is described. (Author)

AD-291 465 Div. 6, 8
(TISTW/DLW) OTS price

Watkins-Johnson Co., Palo Alto, Calif.
10-WATT WIDE-BAND NOISE GENERATOR EQUIPMENT,
by J. H. Foster, J. N. Nelson and others.
Apr 62, 33p. incl. illus. tables.
(Contract AF 33(616)7359, Proj. 0(670-4040))
Unclassified report

DESCRIPTORS: *Noise generators, *Traveling wave tubes, *Radiofrequency generators, *Radar jamming, Power amplifiers, Broadband, Airborne, Design, S band, Microwave equipment, Radiofrequency power.

The development of a broadband microwave noise generator equipment is described. The unit operates in the 2.0 to 4.0 gc frequency range and is capable of delivering 10 watts of integrated noise power output. The unit is designed for aircraft operation. It is housed in an aircraft case and operates from a power source of 115 volts, 400 cps ac. The system is built around two microwave tubes which act as a noise generator and a power amplifier. The noise generator consists of a high gain traveling-

wave tube amplifier which uses its own beam noise as the input signal. Because of its 28 to 30 db noise figure and 70 db of internal gain, the tube is capable of delivering an integrated noise power at its output of 2 mw. The noise generator tube uses periodic permanent magnet focusing, has the dimensions of 1.1 x 1.1 x 9.0 inches and weighs 21 ounces. The power amplifier traveling-wave tube is capable of delivering a minimum of 10 watts power output and exhibits a gain of 35 to 40 db. The tube uses periodic permanent magnet focusing, has the dimensions of 1.5 x 1.8 x 13.5 inches and weighs 3.5 pounds. The noise generator tube and the power amplifier tube are joined by an interstage equalization network which compensates for the gain versus frequency variations of the tubes. The resultant noise spectrum can exhibit a 3 db bandwidth of 1800 mc. (Author)

AD-291 479 Div. 6, 8
(TISTW/DLW) OTS price $3.60

Armour Research Foundation, Chicago, Ill.
EVALUATION AND IMPROVEMENT OF RADAR BEACON SYSTEMS.
Quarterly rept. no. 1, 1 June-31 Aug 62,
by W. Haydl, S. Kazel, and R. Standley. 31 Aug 62, 32p. incl. illus.
(Contract DA 36-039-sc-90693)
Unclassified report

DESCRIPTORS: *Radar beacons, *Diodes, *Microwave amplifiers, *Radar tracking, *Doppler tracking, C band, Amplifiers, Electronic circuits, Velocity, Errors.

Research is concerned with two diverse areas relating to radar-beacon systems: (1) solid state microwave component evaluation and design; and (2) coherent radar-beacon system analysis. A number of tunnel diode detection devices are discussed with particular emphasis being placed on the reflection type tunnel diode amplifier. Theoretical gain curves are given as a function of circuit parameters for C-band operation. The method to be used in designing the amplifier is discussed. The coherent beacon is analyzed to determine the extent of system degradation due to frequency instability. Velocity errors and spectral broadening in two-way Doppler systems are also discussed. (Author)

AD-291 516 Div. 6
(TISTW/RD) OTS price $1.60

General Electric Co., Utica, N. Y.
COUNTERMEASURES TRANSMITTING SET AN/ALT-22(V) AND BARRAGE JAMMER QRC-139A-(T) MODIFICATIONS TO AN/ALT-6B COUNTERMEASURES TRANSMITTING SET AND QRC-139A-(T) AGE EQUIPMENT.
Monthly progress rept. no. 1, 1 Sep-31 Oct 62. 9 Nov 62, 10p.
(Contracts AF 33(604)38334 and AF 09(603)41935)
Unclassified report

DESCRIPTORS: *Radar jamming, *Radar transmitters, Microwave oscillators, L band, Broadband, Radiofrequency spectrum analyzers, Noise generators, Countermeasures, Noise (Radar), Airborne.

Work is described on the manufacture of 30 L-band oscillators for the QRC-139A-(T) and AN/ALT-22(V) jamming systems; the manufacture of two broadband spectrum analyzers, with converter-measuring, L frequency; one servo noise amplifier modification kit; and one noise response modification kit. (Author)

AD-291 626 Div. 6, 8
(TISTE/OHD) OTS price $6.60

Melabs, Palo Alto, Calif.
INVESTIGATION OF CORRELATION TECHNIQUES FOR MICROWAVE RADIOMETRIC SENSORS.
Quarterly engineering rept. no. 2, 15 Aug-15 Nov 62,
by W. E. Budd and R. G. Fawcett. 15 Nov 62, 59p. illus.
(Contract AF 33(657)9183, Proj. 4122)
Unclassified report

DESCRIPTORS: *Correlation techniques, *Radiometers, Mathematical analysis, Lobing, Theory, Radar scanning, Infrared scanning, Velocity, Sensitivity, Antiaircraft defense systems, Statistical functions.

An analysis of the dynamics of a correlating radiometric sensor is given. Included in the analysis is the interdependence of target detectability, time-on-target, and target penetration into the surveillance volume. The use of practical components and their effects on the system performance were investigated. Several design charts are presented which permit graphic evaluation of various system concepts in terms of target and operational characteristics. (Author)

AD-291 741 Div. 6, 12
(TISTW/PCR) OTS price $3.60

White Sands Missile Range, N. Mex.
WHITE SANDS MISSILE RANGE AN/FPS-16 RADAR PERFORMANCE IN TRACKING THE PROJECT MERCURY CAPSULE.
by R. E. Green. Sep 62, 28p. incl. illus. tables (Technical rept. no. SELWS-E-101)
Unclassified report

DESCRIPTORS: *Radar tracking, *Space capsules, Calibration, Range, Radar transmitters, Polarization, Television display systems, Recording systems, Radar plotting, Radar ranges, Effectiveness.

The estimates of the dynamic radar cross-section of the Project Mercury Capsule are calculated from the data obtained by the AN/FPS-16 radars at White Sands Missile Range. The measurements were from a track occurring on 29 November 1961. (Author)

7. ELECTRICAL EQUIPMENT

AD-291 432 Div. 7
(TISTM/BRW) OTS price $3.60

Westinghouse Electric Corp., Lima, Ohio.
SOLAR THERMOELECTRIC GENERATOR SYSTEM CONCEPT AND FEASIBILITY STUDY.
Quarterly rept. no. 3, 15 Aug-15 Nov 62,
by A. J. Krause and J. L. McCabria. 15 Nov 62, 33p. incl. illus.
(Contract AF 33(657)8089, Proj. 8173)
Unclassified report

DESCRIPTORS: *Thermoelectricity, Solar energy, Power supplies, Generators, Thermocouples, Heat exchangers, Design, Feasibility studies.

A heat-exchanger has been assembled and tested to determine the performance of the waste heat radi-

ator and to determine the heat losses from the thermoelectric power converter. A thermoelectric module efficiency tester was built and a typical section of thermopile was tested. The test results show that the power required by the thermocouples is 30% greater than anticipated. The power input is greater than anticipated since the efficiency of the couple is 15% lower and the power out is 13.9% greater than the calculated values. Delays are still being encountered in the thermal energy storage system. (Author)

AD-291 477 Div. 7
(TISTE/CAM) OTS price $3.50

Inland Testing Labs., Dayton, Ohio.
ALKALINE BATTERY EVALUATION.
Semi-annual rept. no. 4, 15 Apr-1 Sep 62, by W. W. Clark, W. G. Ingling and others. Oct 62, 1v. incl. illus. tables, 5 refs.
(Contracts AF 33(616)7519 and AF 33(657)8450, Proj. 8173)
(ASD TDR 62-893, pts. 1-2; Supersedes ASD TDR 62-553, AD-278 647, ASD TDR 62-68, AD-273 688 and ASD TR 61-236, AD-267 051)
Unclassified report

DESCRIPTORS: *Alkaline cells, *Power supplies, *Storage batteries, *Wet cells, Reliability, Failure (Mechanics), Life expectancy, Intermetallic compounds, Silver compounds, Nickel compounds, Cadmium compounds, Electrolytic cells, Preparation, Processing, Instrumentation, Thermocouples, Data processing systems, Recording systems, Test equipment, Temperature, Electrolytes, Electric discharges, Satellite vehicles.

The alkaline battery applied research and failure analysis program seeks to establish a broad base of battery test data for use in the design of the electrical system of future space vehicles and to determine the actual failure mechanism of all new battery systems under varying environmental and cycle-life conditions so that improved space batteries can be developed. Another objective is to determine techniques and/or materials to prevent these failures, while at the same time increase the usable watt-hours-per-pound capability and cycle life of the battery. An evaluation was made of one type 12 ampere-hour nickel-cadmium, one type of 15-ampere-hour silver-cadmium, and one type of 25 ampere-hour silver-zinc sealed cells, in addition to an evaluation of one type of 20 ampere-hour nickel-cadmium cells. Cycle-life tests were conducted on the 12 ampere-hour, sealed nickel-cadmium cells in four temperature environments and four depths of discharge, in groups of 10 cells and in batteries of 20 cells. (Author)

AD-291 541 Div. 7, 8
(TISTE/CRJ) OTS price $1.60

ITT-Surprenant Mfg. Co., Clinton, Mass.
DEVELOPMENT AND CONSTRUCTION OF WATER-TIGHT COAXIAL CABLES RG 11 a/u-RG 217/u-RG 218/u.
Interim development rept. 28 June-28 Sep 62. 23 Nov 62, 11p. incl. illus. table.
(Contract NObsr-87574)
Unclassified report

DESCRIPTORS: *Coaxial cables, Moisture-proofing, Dielectrics, Conductors, Ethylenes, Fluorides, Polymers, Test methods, Materials, Seals.

Data are presented concerning the development of three water-tight coaxial cables to be fabricated and tested per specification ships -C-4017. (Author)

AD-291 564. Div. 7, 8
(TISTP/WH) OTS price $1.60

Office of Research Administration, U. of Michigan, Ann Arbor.
IMPULSE RESPONSE SYNTHESIS FOR NETWORKS CHARACTERIZED BY FUNCTIONS OF A FIRST-ORDER, LINEAR OPERATOR,
by E. Lawrence McMahon. Oct 62, 18p. incl. illus. 7 refs. (Technical rept. no. 135; Rept. no. 4853-10-T)
(Contract DA 36-039-sc-89227, Proj. 3A99-06-001-01)
Unclassified report

DESCRIPTORS: *Electrical networks, *Integral transforms, Synthesis.

The use is considered of integral transforms in the synthesis of time-varying networks for a given impulse response. The class of networks considered consists of all those containing a finite number of fixed resistances and time-varying reactances, with every reactive element varying in the same way. Such networks are characterized by finite linear combinations of a first order, linear operator. Using an integral transform developed by Wattenburg, network functions, H(1), which are rational functions of the transform variable, 1, can be obtained for networks in this class. Conversely, if a rational network function and the corresponding linear operator are given, a network realization can be obtained by well-known methods. In synthesizing a network realizing a prescribed impulse response, h(t, tau), neither the rational network function nor the linear operator is known. This report presents a method of finding the operator corresponding to a given h(t, tau), and from this finding the network function H(1). Necessary conditions for the realizability of a given h(t, tau) by a network in the class considered here are presented. (Author)

AD-291 621 Div. 7, 12
(TISTM/EJH) OTS price $8.00

General Electric Co., Philadelphia, Pa.
HYDROGEN-OXYGEN PRIMARY EXTRATERRESTRIAL (HOPE) FUEL CELL PROGRAM.
Final rept., Apr 61-June 62, on Phase 1. Sep 62, 714p. incl. illus. tables.
(Contract AF 33(616)8159, Proj. 8173)
(ASD TDR 62-522) Unclassified report

DESCRIPTORS: *Fuel cells, *Power supplies, *Electric power production, Hydrogen, Oxygen, Fuel tanks, Gases, Storage, Design, Booster rockets, Electrochemistry, Temperature control, Vibration, Spaceships, Operation.

The HOPE (Hydrogen-Oxygen Primary Extraterrestrial) Fuel Cell Program is a multi-phase effort to advance the state-of-the-art of fuel cells by obtaining permanence data under actual space conditions. Phase I of this program resulted in the development and test of a 35-cell 25-watt/28-volt space configuration fuel cell module. The HOPE spacecraft, fuel supply tanks, pneumatics, and thermal systems were designed and fabricated to provide operating capability in orbit for 7 days at 50 watts and be compatible with the Blue Scout launch vehicle. A series of development tests was conducted to verify water removal, thermal design, and 30-day shelf-life of the fuel cell. The 35-cell module was subjected to a series of performance tests. During the last test, it performed continuously for 7 days at an average of 27 watts/29.5 volts. Following this test, the module delivered rated power without interruption during vibration tests simulating Blue Scout booster environment.

Division 7 - ELECTRICAL EQUIPMENT

AD-291 646 Div. 7
(TISTM/REB) OTS price $3.00

Delco-Remy Div., General Motors Corp., Anderson, Ind.
DEVELOPMENT OF SEALED SILVER OXIDE-ZINC SECONDARY BATTERIES.
Final rept., 30 June 60-30 June 62 on Silver Oxide-Zinc Battery Program,
by J. J. Lander and J. A. Keralla. Oct 62, 142p. incl. illus. tables, 40 refs.
(Contract AF 33(600)41600, Proj. 8173)
(ASD TDR 62-668) Unclassified report

DESCRIPTORS: *Storage batteries, *Silver compounds, *Zinc, Silver electrodes, Zinc electrodes, Oxides, Seals, Satellite vehicles, Tests, Design.

A research and development program has been carried out with the objective of providing an hermetically sealed silver oxide-zinc battery for use in satellite applications. The following basic problem areas were studied: (1) silver migration in the cell; (2) battery voltage regulation; (3) zinc particle size and displacement during cycling; (4) gas evolution; and (5) terminal sealing. Sealed cells were designed, constructed, and tested electrically and environmentally. Eighty-nine cells were cycled to failure. Batteries were designed, constructed and life cycle tested. Twelve batteries were cycled to failure; one additional battery was tested environmentally. (Author)

AD-291 681 Div. 7, 8
(TISTP/TL) OTS price $11.50

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
NETWORKS OF TRANSMISSION LINES AND LUMPED REACTANCES,
by Henry George Ansell. June 62, 149p. incl. illus. tables, 24 refs. (Research rept. no. PIBMRI-900-61)
(Contract AF 30(602)2213)
(RADC TDR 62-393) Unclassified report

DESCRIPTORS: *Transmission lines, *Electrical networks, *Complex variables, *Functions, Impedance, Synthesis, Low pass filters, Polynomials, Complex numbers, Electrostatic capacitance.

Networks combining lossless transmission lines of commensurate lengths with lumped elements, especially lumped reactive elements, are investigated. The properties of the network functions encountered are expressed in terms of properties of associated functions of two independent complex variables. The emphasis is on the lossless driving point impedance and the two-variable reactance property that arises. The study of the two-variable reactance property yields a necessary and sufficient coefficient test for this property. It is found that a given expression can be tested for the two-variable reactance property by a finite number of rational operations on the coefficients of the expression. For screening given expressions for the two-variable reactance property, simple necessary conditions are presented. For generating two-variable reactance functions, simple sufficient conditions are presented. In order to synthesize a given two-variable rational expression, operations corresponding to network extractions are presented. It is also shown that a method of Lunnelli for lumped elements has a generalization for two-variable networks. Examples are given of equivalent two-variable networks, derived by these synthesis techniques. (Author)

AD-291 738 Div. 7
(TISTM/ODN) OTS price $1.60

Air Force Cambridge Research Labs., Bedford, Mass.
ON THE POSSIBILITY OF OBSERVING LASER ACTION FROM THE R2 LINE IN RUBY,
by C. Martin Stickley. Sep 62, 9p. incl. illus. 4 refs. (Rept. no. AFCRL 62-716)
(Proj. 4645) Unclassified report

DESCRIPTORS: *Lasers, *Ruby, *Crystals, Broadband, Reflection, Oscillation, Reflectors, Theory.

Normal laser action in ruby occurs only from the R1 line (6943 A). From a knowledge of the absorption coefficients of the R1 and R2 lines, it is shown that it is theoretically possible to obtain oscillation from only the R2 line (6929 A) at room temperature by using end mirrors that have low reflectivity at 6943 A but high reflectivity at 6929 A. Oscillation at the R2 line is not observed when broadband reflectors (silver) are used due to its strong coupling to the R1 line. (Author)

AD-291 739 Div. 7, 25, 17
(TISTM/ODN) OTS price $4.60

Air Force Cambridge Research Labs., Bedford, Mass.
SINGLE CRYSTAL BISMUTH TELLURIDE,
by A. C. Yang and F. D. Shepherd, Jr. Sep 62, 36p. incl. illus. tables, 26 refs. (Rept. no. AFCRL 62-362)
(Proj. 5621) Unclassified report

DESCRIPTORS: *Single crystals (Metallurgy), *Intermetallic compounds, *Semiconductors, *Thermoelectricity, *Single crystals, X-ray photography, Bismuth compounds, Tellurides, Crystals, Preparation, Melting, Rotation, Crystallization, Optics, Test equipment, Transmission, Physical properties, Chemical impurities, Copper compounds, Materials, Growth.

Bismuth telluride single crystals were grown by the Czochralski pulling method in a furnace similar to that used by Ainsworth. Bismuth rich and stoichiometric melts led to p-type crystals. Large excesses of Te and doping with Cu2Te led to n-type crystals. Single crystal growth was sustained at rates as high as 8.5 cm/hr from p-type melts and 0.5 cm/hr from n-type melts. Growth rates above 3 cm/hr resulted in rectangular cross sections. Those below 1 cm/hr resulted in elliptical cross sections similar to those reported by Ainsworth. Typical cross section dimensions were 1.5 x 0.5 cm. Single crystals have been grown up to 22 cm in length. The variation of thermoelectric power with melt composition was observed for compositions near stoichiometry. Normal p-type thermoelectric powers (Seebeck coefficient) ranged from 220 to 260 microvolts/deg C. Normal n-type thermoelectric powers of -15 to -250 microvolts/deg C were obtained. X-ray diffraction lines observed agree with the ASTM index to within experimental error. A transmission edge was observed at approximately 0.145 ev. (Author)

AD-291 750 Div. 7, 8, 26
(TISTE/OHD) OTS price $2.60

Chicago Telephone Supply Corp., Elkhart, Ind.
PRODUCTION ENGINEERING MEASURE FOR SUBMINIATURE, TRANSISTOR TYPE POTENTIOMETERS.
Quarterly progress rept. no. 5, 1 July-30 Sep 62,

by D. C. Kinsey, G. B. Erekson, and C. L. Holmes. 30 Sep 62, 24p. incl. tables.
(Contract DA 36-039-sc-85976)
Unclassified report

DESCRIPTORS: *Potentiometers, *Subminiature electronic equipment, *Subminiature electrical equipment, Production, Test methods, Resistance, Reliability, Life expectancy, Tests, Moistureproofing.

One hundred forty-four controls were submitted to preliminary preproduction testing to evaluate the modification in design. Test results indicate that the reliability of the unit has been increased by these modifications and the improvements made in the resistance element. (Author)

AD-291 823 Div. 7, 11, 25
(TISTM/RGR) OTS price $5.60

Research Labs. for the Engineering Sciences, U. of Virginia, Charlottesville.
RESEARCH INVESTIGATION OF MAGNETIC AND ELECTRIC FORCES FOR ROTATING SHAFT SUSPENSION.
Technical progress rept., Sep-Nov 62,
by B. J. Gilpin. Dec 62, 51p. incl. illus. tables, 7 refs. (Rept. no. EMI-4454-109-62U)
(Contract AF 33(657)8352)
Unclassified report

DESCRIPTORS: *Servo systems, *Bearings, *Induction motors, Magnetic materials, Armatures, Resonance, Magnetic cores, Electrical equipment.

Preliminary dynamic tests are described and the resulting problems are given for the induction motor freely supported by a radially passive magnetic system. The progress and problems for the one-dimensional models of each of the following systems are given: (1) radially active system with laminated iron armature, (2) resonant magnetic system, and (3) resonant electric system. The study of a radially active magnetic system using a permanent magnet rotor and air core coils is given in detail. The conclusion is reached that such a system may be ruled out as a practical bearing system. (Author)

AD-291 882 Div. 7, 4
(TISTM/ODN) OTS price $5.60

Westinghouse Electric Corp., Pittsburgh, Pa.
AN INVESTIGATION OF SOLID ELECTROLYTE FUEL CELLS.
Quarterly technical progress rept. no. 3,
by D. H. Archer, W. G. Carlson and others.
1962, 1v. incl. illus. table, 2 refs. (Rept. no. BPS 2-3-3145-60813-17)
(Contract AF 33(657)8251)
Unclassified report

DESCRIPTORS: *Fuel cells, *Power supplies, *Oxides, Zirconium compounds, Yttrium compounds, Electrolytes, Resistance, Glass seals, Manufacturing methods, Oxygen, Calcium compounds, Electrolytic cells, Electrodes, Platinum, Voltage, Electric currents, Hydrogen, Diffusion, Theory, Tests.

Improved electrolyte resistivity measurements were made on both the (ZrO2)0.85 (CaO)0.15 and the (ZrO2)0.9 (Y2O3)0.1 electrolytes using four terminal specimens. The properties of platinum paste electrodes applied to these substrates were studied. Sheet resistivities of the electrodes in air, hydrogen-water mixtures and in dry hydrogen were measured using four terminal resistivity samples. The adherence of electrodes after prolonged exposure to these atmospheres was observed. The effects of electrode current and of oxygen in pumping to and from the electrode-electrolyte interface on electrode adherence were studied. The third and fourth stacked tube fuel cell batteries each consisting of three cells connected in series were assembled and tested. Static leak measurements showed improved seal performance. Studies aimed at determining the size of stacked tube solid electrolyte power plants consisting of a number of parallel tube stacks which could be operated without internal cooling of the stack array were completed. For 28 volt power systems this size is about 2 kilowatts. Operation of the solid electrolyte fuel cell using oxygen instead of air as the oxidant was demonstrated. Cell segments of reduced length and of bell and spigot design were fabricated. (Author)

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-291 206 Div. 8, 12
(TISTE/CAM) OTS price $8.10

Melpar, Inc., Falls Church, Va.
PARAMETRIC AMPLIFIER INTERFERENCE SUSCEPTIBILITY STUDY.
Technical note on Long Range Communications Interference Study,
by David H. White. Nov 62, 74p. incl. illus. 13 refs.
(Contract AF 30(602)2528)
(RADC TDR 62-360, vol. 3)
Unclassified report

DESCRIPTORS: *Parametric amplifiers, *Satellite vehicles, *Radio interference, Noise (Radio), Test equipment, Experimental data, Sensitivity, Measurement, Communication systems.

An experimental study of the susceptibility of a parametric amplifier to pulse type radio frequency interference was conducted. Standard RFI criteria were examined from the viewpoint of their validity for pulse type interfering signals. It was found that the parametric amplifier possessed a 60 db dynamic range, and was characterized by a virtually instantaneous recovery time. (Author)

AD-291 210 Div. 8
(TISTP/FR) OTS price $2.60

Naval Research Lab., Washington, D. C.
AN ALPHA RHYTHM FEEDBACK CONTROL UNIT.
Interim rept.,
by W. D. Dahl. 21 Nov 62, 21p. incl. illus. 19 refs. (NRL rept. no. 5848)
Unclassified report

DESCRIPTORS: *Electroencephalography, *Instrumentation, Audio amplifiers, Integration, Band-pass filters, Oscillators, Power supplies, Pulse generators.

It has been hypothesized that if a photic stimulus is applied to a subject at the proper time during each cycle of his alpha rhythm, the alpha rhythm will be reinforced. Electronic analog equipment was designed and constructed, giving the experimenter the necessary control of the phase of the stimuli. The input signal to this equipment is obtained from the amplifier of any one of the eight channels of the EEG recorder. A 10-microsecond output pulse (ad-

justable from 0 to 60 volts) triggers a photolamp placed directly in front of the subject's closed eyes. The resultant photic stimulation presumably modifies the alpha rhythm, thereby completing a closed feedback loop. In tests using a simulated alpha rhythm signal consisting of a sinusoidal waveform, the phase of the output pulse was adjustable to an accuracy of better than 1 percent. The phase jitter was about 0.1 percent. With a more realistic test signal consisting of a sine wave mixed with low-frequency noise (signal-to-noise ratio of about 5) the phase jitter increased to about percent. (Author)

AD-291 232 Div. 8
(TISTE/CAM) OTS price $2.60

Microwave Associates, Inc., Burlington, Mass.
PEM - SOLID STATE MICROWAVE TR-ATR SWITCH.
Quarterly technical rept. no. 1, 18 Apr-18 July 62,
by Robert Teneholtz. 18 July 62, 27p. incl. illus.
(Contract DA 36-039-sc-86718)
Unclassified report

DESCRIPTORS: *Microwave networks, *Electronic switches, *Waveguide switches, *Diodes, *Radar duplexers, X band, Transmit-receive tubes, Anti-transmit-receive tubes, Solid state physics, Silicon compounds, Monoxides, Thin films, Manufacturing methods.

Work was concentrated in two major areas. These concerned microwave circuit design and diode material problems. Efforts with respect to the former involved a basic theoretical investigation in addition to development of a prototype solid sate balanced duplexer. Successful test results secured on this unit are presented. As for the semiconductor material aspect, a discussion on processing problems involved in securing a large yield on high and low power limiting diodes is presented. (Author)

AD-291 235 Div. 8, 20
(TISTE/CAM) OTS price $8.10

Naval Radiological Defense Lab., San Francisco, Calif.
RADIATION EFFECTS IN THERMOELECTRICS. I. TECHNIQUES FOR DETECTION OF TRANSIENT EFFECTS AND THEIR APPLICATION TO COMMERCIAL GRADE BISMUTH TELLURIDE,
by J. W. Winslow and R. R. Hart. 13 Sep 62, 78p. incl. illus. tables, 7 refs. (Rept. no. NRDL TR-581)
Unclassified report

DESCRIPTORS: *Thermoelectricity, *Semiconductors, *Radiation effects, Resistance, Bismuth compounds, Tellurides, Neutrons, Gamma rays, Photons, Test equipment, Test methods, Experimental data, Nuclear energy, Thermopiles, Production.

Two satisfactory laboratory methods for detecting and studying transient radiation effects on Seebeck coefficient, S, and electrical resistivity, Rho, of materials having large thermoelectric figures of merit, z, were developed. The transient effects of intense beams of 2 Mev electrons on z in commercially available, thermoelectric grade bismuth telluride, were deduced from separate observations of S and Rho made using these methods, together with previously reported observations of thermal conductivity. These observations indicate that ionizing radiation has no transient effects on the point value of z, within experimental limits of accuracy amounting to ± 50%. Secondary effects very probably arising from inhomogeneity of the test material were observed. A simple model for, and some of the implications of, these observations are discussed. (Author)

AD-291 239 Div. 8
(TISTE/CAM) OTS price $4.60

Aeronautical Electronic and Electrical Lab., Naval Air Development Center, Johnsville, Pa.
INFORMATION ON MICROELECTRONICS FOR NAVY AVIONICS EQUIPMENT,
by H. B. Martin. 26 Nov 62, 45p. incl. illus.
(Rept. no. NADC-EL-6276; Micro-Notes no. 2)
(WEPTASK no. RAV03J002/2021/R008-03-01)
Unclassified report

DESCRIPTORS: *Microminiaturization (Electronics, *Electronic circuits, Standards, Tests, Scientific research, Experimental data, Navy.

The purpose of this information is to promote the application of microelectronics in avionics equipment from technical information on evaluation, application, research and development, availability of microelectronic hardware, and standardization activities. (Author)

AD-291 404 Div. 8
(TISTM/BRW) OTS price $4.60

Aeroprojects, Inc., West Chester, Pa.
ULTRASONIC WELDING PROCESS AND EQUIPMENT FOR CONSTRUCTION OF ELECTRON-TUBE MOUNTS.
Quarterly progress rept. no. 1, 27 June-30 Sep 62,
by William Rosenberg. 30 Sep 62, 42p. incl. illus. tables, 4 refs.
(Contract DA 36-039-sc-86741)
Unclassified report

DESCRIPTORS: *Electron tubes, Manufacturing methods, Welding, Ultrasonics, Industrial equipment, Metal joints, Bonding.

The purposes of the program are outlined. The fundamentals of the ultrasonic welding process are briefly presented. Ultrasonic welding equipment of the types and sizes relevant to this program is described. Problems encountered in the resistance welding of electron-tube mounts are discussed, and compared in kind with ultrasonic welding. Progress in material procurement, as well as in tooling and testing for the weld-study task, are reported. The component assembly sequences of three electron tubes, together with accompanying cataloging of welds, are shown. (Author)

AD-291 421 Div. 8, 26
(TISTE/CAM) OTS price $1.60

Western Electric Co., Laureldale, Pa.
PRODUCTION ENGINEERING MEASURES. HIGH FREQUENCY TRANSISTOR.
Quarterly progress rept. no. 5, 20 June-20 Sep 62,
by T. G. Stoudt. 20 Sep 62, 13p. incl. illus.
(Contract DA 36-039-sc-85969)
Unclassified report

DESCRIPTORS: *Transistors, *Manufacturing methods, Ultra high frequency , Germanium, Evaporation, Preparation, Processing, Experimental data, Diffusion, Noise (Radio), Electrical properties, Production.

Effort on the production engineering measure for the 1000 mc germanium transistor was devoted to

the following areas: (1) developing improvements in epitaxial substrate material, (2) developing improvements in diffusion of epitaxial material, and (3) continued evaluation of practical techniques and tooling for evaporation and wire bonding processes. (Author)

AD-291 431 Div. 8
(TISTW/DLW) OTS price $4.60

Varian Associates, Palo Alto, Calif.
HIGH POWER R-F WINDOW STUDY PROGRAM.
Quarterly technical note no. 1, 6 July-30 Sep 62,
by Floyd Johnson. Oct 62, 44p. incl. illus. table, 7 refs.
(Contract AF 30(602)2844, Proj. 5573)
(RADC TDR 62-510)
Unclassified report

DESCRIPTORS: *Waveguide windows, *Dielectrics, Wave transmission, X band, Radiofrequency power, Microwaves, Waveguides, Dielectric films, Dielectric properties, Coatings, Beryllium compounds, Oxides, Design, Tests.

The research objective is the design of an X band window with 25% bandwidth and a 250 kw c-w power handling capacity. Design work includes analytical and experimental investigations of various window configurations and dielectric materials under strong multipactor conditions. Samples of beryllium oxide of various purities, formed by dry isostatic pressing, were tested for loss tangent, dielectric constant, and purity. The ring resonator was used to test the first BeO block windows up to 253 kw of c-w power. Losses in the test section and window were repeatedly measured to be 700 watts, or about 0.3% of the total transmitted power. Temperature gradients in the BeO window were also estimated. A derivation of the ghost mode distribution in dielectric loaded waveguide was made and a plot of this distribution is shown. An analysis of the design, fabrication and operation of the dual disc type of configuration was made. Investigations were also made of conductive coatings for windows to reduce secondary emission and drain excessive charge from the window face.

AD-291 455 Div. 8, 25
(TISTE/CRJ) OTS price $2.60

Microwave Lab., Stanford U., Calif.
MICROWAVE RESEARCH.
Quarterly status rept. no. 15, 1 Aug-31 Oct 62. Nov 62, 21p. incl. illus. tables, ref. (ML rept. no. 985)
(Contract Nonr-22548, Proj. NR 373-361)
Unclassified report

DESCRIPTORS: *Microwave equipment, Frequency multipliers, Lasers, Ferrites, S band, Klystrons, Electron beams, Parametric amplifiers, Quantum mechanics, Ruby, Microwaves, Propagation, Semiconductors, Piezoelectric crystals, Gas discharges, Plasma physics.

AD-291 457 Div. 8
(TISTE/CAM) OTS price $16.00

Electron Physics Lab., U. of Michigan, Ann Arbor.
THEORETICAL AND EXPERIMENTAL INVESTIGATION OF LARGE-SIGNAL TRAVELING-WAVE TUBES.
Final rept., 1 July 60-1 July 62,
by G. T. Konrad, S. G. Lele and others.
July 62, 221p. incl. illus. (Rept. no. 03736-14-F)
(Contract AF 30(602)2303)
(RADC TDR 62-392) Unclassified report

DESCRIPTORS: *Traveling wave tubes, *Microwave amplifiers, *Klystrons, Space charges, Theory, Electron guns, Attenuation, Magnetrons, Backward-wave oscillators, Electron beams, Focusing, Coupling circuits, Waveguide couplers, Propagation, Integration, Vacuum systems, Transducers, Cavity resonators, Noise, Impedance, Theory, Relativity theory, Harmonic analysis, Numerical methods and procedures, Bessel functions, Plasma physics, Partial differential equations.

Nonlinear Interaction Theory: Several problems are studied which relate to the interaction and efficiency obtainable in a traveling-wave amplifier. Experiments on Traveling-Wave Amplifiers: Several experiments on broadband amplifiers of the Crestatron type are reported at S-band and at the UHF frequencies. Elliptic cavity coupling transducers are analyzed and the use of a ring and bar structure in a high-power Crestatron amplifier is evaluated. Electron Gun Analysis: The Poisson cell and analog computer are used to analyze microperveance one and two solid-beam electron guns. A design is developed for a high-density hollow-beam magnetron injection gun. Noise Propagation in Plasma Interaction: An analysis of noise fluctuations and transport on an axially symmetric electron beam is made using both a density function method and a Monte Carlo calculation. A two-dimensional discrete beam model is utilized and the results are compared with previous one-dimensional theories. (Author)

AD-291 498 Div. 8
(TISTP/TL) OTS price $5.60

Cruft Lab., Harvard U., Cambridge, Mass.
A SELF-ORGANIZING CONTROL SYSTEM BASED ON CORRELATION TECHNIQUES AND SELECTIVE REINFORCEMENT,
by Donald N. Streeter and Kumpati S. Narendra.
20 July 62, 36p. illus. 20 refs. (Technical rept. no. 359)
(Contract Nonr-186616, Proj. NR 372-012)
Unclassified report

DESCRIPTORS: *Control systems, *Correlation techniques, *Cybernetics, *Simulation, Learning, Synthesis, Feasibility studies, Design, Animals.

Control systems that exhibit a capacity to learn, in the sense of meaningful self-alteration based on experience are studied. The relation between learning, adaptation, and self-organization in control systems and in animals is discussed. A system capable of synthesizing its controllers without explicit knowledge of the process or the spectra of the inputs is described. The synthesis is based on the cross-correlation between a signal representing the desired output state and the various components of the tentative input signal. The system, in a general way, exemplifies the principles of learning used in programming a computer to play checkers. Results of computer simulation of the system are presented. The purpose is to present the motivation and the physical reasoning on which the system was based. Results of computer simulation of a self-organizing system are presented to demonstrate the feasibility of the design. (Author)

AD-291 505 Div. 8
(TISTP/FR) OTS price $10.50

Army Signal Radio Propagation Agency, Fort Monmouth, N. J.
ANALYSIS AND PREDICTION OF SKY-WAVE FIELD INTENSITIES IN THE HIGH FREQUENCY BAND,
by Paul O. Laitinen and George W. Haydon.
Mar 56, rev. Oct 62, 124p. incl. illus. tables.
(Technical rept. no. 9; RPU-203; Supersedes AD-210 022)
Unclassified report

DESCRIPTORS: *Ionosphere, *Radio waves, *Ionospheric propagation, *Attenuation, Intensity, Absorption, Sun, Sunspots, Periodic variations, Diurnal variations.

An engineering method of evaluating sky-wave field intensities in the high frequency band for any transmission distance up to about 15,000 kilometers is presented. Field intensity recordings were statistically analyzed in order to study daytime absorption, day-to-day variations, and absolute magnitudes. Based upon the analysis, a proposed prediction method was obtained which should give relatively accurate sky-wave field intensities for the frequencies and distances considered. Succeeding sections show the method of analysis of absorption, the method of analysis of absolute magnitudes, the method of analysis of day-to-day variations, the proposed field intensity prediction method, and summarizing conclusions. All necessary equations used in the prediction method are represented in nomograms. (Author)

AD-291 507 Div. 8
(TISTP/TL) OTS price $3.60

Dewey, G. C., and Co., Inc., New York.
AN EXPERIMENTAL INVESTIGATION OF THE EFFECTS OF RADIATION ON THE PROPAGATION OF ELECTROMAGNETIC SIGNALS IN AIR.
Quarterly progress rept. no. 5, 1 July-30 Sep 62,
by M. N. Hirsh and P. N. Eisner. 30 Sep 62, 30p. incl. illus. tables, refs. (Rept. no. R-146-5)
(Contract DA 36-039-sc-87318)
Unclassified report

DESCRIPTORS: *Radio signals, *Radar signals, *Radiation effects, *Air, Vacuum systems, Electron beams, Diffusion, Measurement, Gases, Pressure, Radiofrequency, Oxygen, Ionization, Experimental data, Frequency shift, Cavity resonators, Atmosphere, Propagation.

Contents:
Vacuum
Electron beam diffusion and measurement
Gas pressure measurement
Radiofrequency measurements
Oxygen ionization experiments
Processes in oxygen
Estimates of experimental uncertainties

AD-291 533 Div. 8
(TISTE/CAM) OTS price $9.60

General Electric Co., Pittsfield, Mass.
DESIGN STUDY OF A TRANSPORTABLE ANTENNA SYSTEM.
Quarterly rept. no. 1, 1 June-30 Aug 62,
by P. A. Blasangame. 30 Aug 62, 110p. incl. illus. tables, refs. (Rept. no. 1)
(Contract DA 36-039-sc-90713)
Unclassified report

DESCRIPTORS: *Parabolic antennas, *Radar antennas, *Radar tracking, Satellite vehicles, Communication systems, Radar equipment, Radar pulses, Errors, Analysis, Radomes, Power drives, Train power drives, Mobile, Antenna horns, Antenna hardware, Maintenance, Cargo vehicles, Trailers, Gust loads, Load distribution, Wind, Automatic.

Effort is presented on the design study of a transportable antenna system. This study phase synthesized two preliminary designs to establish broad parameters and to define areas requiring detailed study. Design A was synthesized to obtain (at minimum cost and weight) optimal accuracy within the twelve hour erection time requirement. The Design B objective was to attain greatest possible accuracy while minimizing other parameters such as cost, weight and erection time. The greatest emphasis in the study was placed in design B in an attempt to meet the accuracy requirement while minimizing the erection time. Design A has a thirty foot diameter reflector. It is pallet loaded and transportable in three M-35 trucks. It is powered by geared electric drives and utilizes a thin wall inflatable radome. It can be erected in twelve hours and has a circular error probable of 0.2 to 0.3 milliradian. It will weigh approximately 10,000 pounds. Design B has a forty foot diameter reflector and is transported by one special trailer, two standard trailers and three M-35 trucks. It can be erected in one day or more and has a CEP of 0.10 to 0.15 milliradian. It is powered by electric direct drive motors and is equipped with a randomized space frame radome. The equipment will weigh approximately 100,000 pounds. (Author)

AD-291 574 Div. 8
(TISTE/CAM) OTS price $2.60

Microwave Associates, Inc., Burlington, Mass.
HIGH POWER SEMICONDUCTOR PHASE SHIFTING DEVICES.
Quarterly progress rept. no. 3, 1 July-28 Sep 62,
by Charles Howell and Joseph White. Nov 62, 14p. illus.
(Contract NObsr-87291, Proj. SR 008-03-02)
Unclassified report

DESCRIPTORS: *Semiconductors, *Phase shifters, Diodes, S band, Electronic circuits, Microwave equipment, Radiofrequency power, Measurement, Experimental data, Ultra high frequency, Superhigh frequency.

Effort was continued to investigate microwave phase shifting techniques, excluding ferromagnetic and mechanical methods, to make recommendations for the new phase shifting techniques which provide improved electrical scanning, and to develop models of a phase shifter utilizing these techniques. A 3000 Mc step phase shifter was tested and evaluated. Results obtained included a peak power capability of 5 kw at a 0.5 microsecond pulse length with an average power of 25 watts. Step phase shifts were obtained which could be varied from 0 degrees to 180 degrees while maintaining a transmission insertion loss of less than 0.7 db in both phase states. (Author)

AD-291 581 Div. 8
(TISTE/CRJ) OTS price $3.60

Microwave Associates, Inc., Burlington, Mass.
HIGH POWER TRANSMISSION LINE AND ASSOCIATED MICROWAVE PARTS.

Quarterly progress rept. no. 5, 1 July-30 Sep 62, by Meyer Gilden. 30 Sep 62, 17p. illus. (Contract NObsr-85455)
Unclassified report

DESCRIPTORS: *Transmission lines, *Waveguides, S band, Radiofrequency power, Waveguide windows, Waveguide couplers, Radar duplexers, Radar equipment, Microwave equipment.

Components which are being completed for a high power S-band transmission line are described and some of their characteristics given. Previous recommendations for a very high power transmission line using the TE_{01}^{o} mode in circular waveguide are amplified. (Author)

AD-291 592 Div. 8, 25, 4
(TISTE/CRJ) OTS price $6.60

Space Technology Labs., Inc., Redondo Beach, Calif.
LIQUID LASER RESEARCH.
Semi-annual progress rept. no. 4, 7 Mar-15 Oct 62,
by Maurice W. Windsor. 31 Oct 62, 58p. incl. illus. tables, 40 refs. (Rept. no. 8657-6004-RU000)
(Contract AF 04(695)97)
(SSD TDR 62-180) Unclassified report

DESCRIPTORS: *Lasers, *Liquids, Benzophenones, Chelate compounds, Terbium compounds, Dielectrics, Mirrors, Glass, Plastics, Rods, Preparation, Liquefied gases, Phosphorescence, Polymers, Spectrographic analysis, Life expectancy.

Results highly suggestive of laser action have been obtained for benzophenone and a chelate of terbium in rigid organic glasses at 77 K. A resonant laser cavity employing multiple-layer, dielectric-coated, confocal mirrors was constructed. This was used for the low-temperature glass studies. Extension of observations to liquid systems is a simple matter using the above cavity. A high power flash apparatus of 12,800 joule capacity was constructed for excitation purposes. A technique was developed for flashing lamps immersed in liquid nitrogen. Techniques were developed for incorporating aromatic compounds and chelates into plastic rods for laser evaluation. Lifetimes of aromatic compounds in plastics were measured. Rare-earth ions and chelates were evaluated for potential laser action in liquid solutions and experimental studies were started. Novel ways of experimentally increasing quantum yields are under consideration. (Author)

AD-291 600 Div. 8, 26, 30
(TISTM/TCG) OTS price $3.60

Texas Instruments, Inc., Dallas.
SILICON SEMICONDUCTOR NETWORKS MANUFACTURING METHODS.
Interim technical engineering rept., 1 Jan-31 Mar 62,
by J. W. Lathrop and W. C. Brower. Nov 62, 34p. incl. illus.
(Contract AF 33(600)42210, Proj. 7-865)
(ASD Interim rept. no. 7-865, vol. 6)
Unclassified report

DESCRIPTORS: *Semiconductors, *Silicon, *Subminiature electronic equipment, Electronic circuits, Materials, Processing, Chemical milling, Diffusion, Growth, Lead, Glass, Films, Electron beams, Evaporation, Vapor plating, Bonding, Test methods, Packaging, Test equipment, Welding, Brazing, Design, Mathematical analysis, Switching circuits, Production, Manufacturing methods.

Process studies were concluded. Techniques have been developed for evaluation of all diffusion parameters. All machines for the pilot line are either completed, being constructed or modified, or in advanced design stage. The philosophy guiding creation of these machines is that all possible operations will be performed on the functional electronic blocks while they are still in slice form. These operations include cleaning, polishing, photoresist applications, etching, diffusion, and application of evaporated leads and contacts. Considerable progress has been made toward perfecting a welded package. (Author)

AD-291 601 Div. 8
(TISTE/CRJ) OTS price $6.60

Union Carbide Corp., Parma, Ohio.
ACTIVE THIN FILM CIRCUIT FUNCTIONS.
Quarterly rept. no. 1, 1 June-31 Aug 62,
by R. G. Breckenridge. 31 Aug 62, 77p. incl. illus. tables, 35 refs.
(Contract DA 36-039-sc-90734, Proj. 3A99-21-001)
Unclassified report

DESCRIPTORS: *Electronic circuits, *Thin films, Single crystals, Silicon, Growth, Surfaces, Vacuum apparatus, Deposits, Chlorides, Vaporization, Evaporation, Cleaning, Pyrolysis, Silanes.

A study was initiated of the problem of producing a thin single crystal film of silicon on a foreign substrate, preferably one normally used in electronic technology. The likely techniques of deposition of silicon films such as vacuum evaporation or chemical reduction methods are explored on a theoretical basis as is the process of epitaxial crystal growth. The choice of suitable substrate materials is also considered. Based on these considerations and prior experience, apparatus was assembled and a series of experimental trials were made. While the problem is a difficult one, even these early results are hopeful. Single crystal epitaxial growths were obtained on a variety of single crystal substrates which were used as controls. In addition, preferred orientations and partial crystal growths were observed on other substrates of several types. (Author)

AD-291 607 Div. 8
(TISTE/CRJ) OTS price $3.60

Westinghouse Electric Corp., Baltimore, Md.
3.0 MILLIMETER WAVELENGTH DUPLEXER.
Quarterly progress rept. no. 2, 15 July-15 Oct 62,
by James D. Woermbke and Stafford D. Schreyer.
15 Oct 62, 38p. incl. illus.
(Contract DA 36-039-sc-89223)
Unclassified report

DESCRIPTORS: *Radar duplexers, *Transmit-receive tubes, *Switching circuits, *Crystal detectors, Extremely high frequency, Waveguides, Waveguide windows, Microwave equipment, Gases, X band, Manufacturing methods, Test equipment.

Effort was concentrated on establishing an initial tube design, scaling experiments at X-band, the assembly of a low level test bench, and the establishment of a precision machine shop. A preliminary tube was designed, and a complete set of drawings were made. Several parts of the tube not contingent upon the

electrical parameters of the tube are being made. Low level matching studies have begun with parts scaled to X-band. Initial data show that the required frequency band can be covered with a three-element, band-pass structure having loaded element Q's of approximately six. Many of the parts required for matching studies at 3 mm were made. The necessary microwave components were received, and a 3-mm low level test bench was assembled. A small machine shop consisting of jewelers lathe, drill press, and milling machine, which are capable of the high accuracy work required, was assembled. (Author)

AD-291 618 Div. 8
(TISTE/CRJ) OTS price $4.60

David Sarnoff Research Center, Princeton, N. J.
CESIUM VAPOR CATHODE STUDY,
by A. L. Eichenbaum, F. Norman and others.
14 Sep 62, 43p. incl. illus. tables (Technical note no. 1)
(Contract AF 30(602)2767, Proj. 5573)
(RADC TDR 62-489) Unclassified report

DESCRIPTORS: *Cathodes (Electron tubes), *Plasma physics, *Electron guns, Cesium, Electron beams, Vapors, Ions, Thermionic emission, Ionization, Electron tube heaters, Mathematical analysis, Shielding, Materials, High temperature research, Voltage, Synthesis, Electrical properties.

Experimental and theoretical studies have been initiated on cesium plasma guns with the objective of obtaining beam-current densities of 100 A/sq cm. Problems of beam acceleration, cesium-vapor recirculation and RF breakdown are also considered. Two plasma guns were designed to yield beams of 100 A/sq cm density. In the first of these, ions are produced by contact ionization of cesium at a hot carbon surface opposite an L-cathode. Electrons from the cathode are converged and pass through an aperture in the ion emitter. In the second gun, ions and electrons are produced at the inner surface of a hollow tantalum cathode; the electrons are thermionically emitted from it and ions are obtained by contact ionization of cesium. Electrons are extracted from the hollow cathode through a small aperture. A third tube was designed utilizing a cathode similar to that used in the second tube. The third tube has means for (1) beam acceleration to several kilovolts, (2) cesium recirculation, and (3) beam analysis. (Author)

AD-291 660 Div. 8
(TISTE/CAM) OTS price $4.60

Doucette, E. I., Associates, Inc., Chatham, N. J.
A QUANTITATIVE STUDY OF THE EVOLUTION OF GASES FROM ELECTRON TUBES AND MATERIALS.
Scientific rept. no. 2, 18 Mar-18 June 62,
by W. J. Grubbs and G. H. Snider. 18 July 62,
47p. incl. illus. tables.
(Contract AF 19(628)326, Proj. 4619)
(AFCRL 62-769) Unclassified report

DESCRIPTORS: *Electron tubes, *Gases, Degasification, Deterioration, Measurement, Reliability, Spectrographic analysis, Vacuum systems, Mass spectrometers, Ionization gages, Calibration, Test equipment, Experimental data, Carbon compounds, Monoxides.

Progress in achieving a higher degree of reliability in electron tubes through a better understanding of the kinds and quantities of gases which occur in these tubes is reported. A bakeable, ultra-clean high vacuum system which incorporates an omegatron mass spectrometer was constructed. Effort was devoted to the calibration of the six ionization gauges and the omegatron mass spectrometer tube. Calibration procedures are detailed and the results obtained are presented. (Author)

AD-291 666 Div. 8, 9, 25
(TISTE/OHD) OTS price $6.60

Microwave Devices Lab., U. of Utah, Salt Lake City.
(No title).
Consolidated quarterly rept., 1 July-30 Sep 62.
30 Sep 62, 63p. incl. illus. table (Technical rept. no. MDL-Q2)
(Contracts Nonr-128805, AF 04(647)745, AF 33(657)8677, and Grant G-15017)
Unclassified report

DESCRIPTORS: *Traveling wave tubes, *Microwave equipment, *Electron beams, *Plasma physics, *Solid state physics, Extremely high frequency, Backward-wave oscillators, Impedance matching, Waveguides, Ferrites, Radiofrequency power, Waveguide windows, Cyclotrons, S band, Cavity resonators, Mathematical analysis, Plasma jets, Electron guns, Rocket, Cryogenics, Lasers, Gamma rays, Mercury lamps, Luminescence, Exhaust gases.

Research activity is reported to extend the useful frequency spectrum into the range from microwave frequencies to optical frequencies, and to improve existing devices and frequencies in the microwave spectrum. At present this objective is being pursued by studies of electron beam devices, solid state devices, and plasmas. Two experimental projects on millimeter-wave devices and a theoretical study of multiple beam interaction are being pursued. (Author)

AD-291 675 Div. 8
(TISTE/OHD) OTS price $2.60

HRB-Singer, Inc., State College, Pa.
PHASE SHIFT AMPLIFIER.
Quarterly progress rept. no. 2, 1 Aug-31 Oct 62 on Research and Development of Phase Shift Amplifiers in the 300 to 1200 Mc Band,
by P. E. Matten, H. D. Haag and W. Radzelovage.
Jan 63, 22p. incl. illus. (Rept. no. 358-2)
(Contract DA 36-039-sc-89096, Proj. 2Z44-02-001)
Unclassified report

DESCRIPTORS: *Parametric amplifiers, *Phase shifters, Ultra high frequency, Broadband, Transmission lines, Measurement, Diodes, Semiconductors, Variable capacitors, Sidebands, Radiofrequency spectrum analyzers, Analysis.

Progress in the development of phase shift amplifiers for the 300 to 600 and the 600 to 1200 mc bands is reported. Concentration has been directed toward increased understanding of the phase-shift technique and improvement in the operation of the bench model for the 600 to 1200 mc band. It was shown that theory definitely admits that oscillation and regeneration are possible as has been observed experimentally and that controlled relative sideband powers are requisite if stable operation is to be achieved with high gain. (Author)

AD-291 688 Div. 8
(TISTE/OHD) OTS price $3.60

Microwave Associates, Inc., Burlington, Mass.
INVESTIGATION OF HIGH POWER GASEOUS ELECTRONICS.
Quarterly progress rept. no. 3, 1 July-30 Sep 62,

by Harold S. Maddix. 30 Sep 62, 21p. illus. 8 refs.
(Contract DA 36-039-sc-89161)
Unclassified report

DESCRIPTORS: *Discharge tubes, *Gas discharges, *Electronic switches, *Radar duplexers, Electric discharges, Argon, Temperature, Degasification, Adsorption, Plasma physics, Gas ionization.

Argon cleanup and recovery in quartz vials due to the action of a microwave discharge is discussed in terms of the experimental results. Cleanup is approximately independent of temperature over a -100 to +600 C range whereas spontaneous thermal recovery rates are proportional to temperature. The cleanup phenomena are explained on the basis of a surface of deformation-annealing sequence. (Author)

AD-291 696 Div. 8
(TISTE/OHD) OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
A TRANSISTORIZED ELECTRONIC SWITCH,
by K. G. Williams. Nov 62, 6p. incl. illus. 1 ref. (Rept. no. NOLTR 62-139)
Unclassified report

DESCRIPTORS: *Transistors, *Electronic switches, High frequency, Switching circuits.

A useful, compact transistorized electronic switch, applicable to both analog and digital type signals, is described. Circuit operation and performance characteristics are discussed in detail. The switch has been employed in sonar experiments and data reduction programs. It features a switching speed of .07 microseconds and a flat frequency response to above 10 megacycles. (Author)

AD-291 697 Div. 8
(TISTP/TL) OTS price $2.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
ANALYSIS OF A PULSED-LIGHT DEEP-OCEAN SEARCH SYSTEM,
by R. D. Hitchcock. 23 Nov 62, 29p. incl. illus. table, 38 refs. (Technical rept. no. R-209)
(Proj. Y-F015-01-001(e))
Unclassified report

DESCRIPTORS: *Underwater, *Detection, *Engineering, *Oceans, *Light, *Wave transmission, *Underwater object locators, Television cameras, Underwater photography, Identification.

In the study of methods for locating deep-ocean structures a major problem is the identification of objects at distances beyond 10 meters. Because underwater sonar detection devices do not provide definition comparable to that of optical detectors, there is a need for an extended-range undersea television system. Extension of underwater visibility would result from the use of pulsed light synchronized with a gated video camera, because veiling luminance caused by back-scattered light would be reduced. Analysis of a hypothetical system using a pulsed searchlight and an internally gated television camera shows that the maximum range of such a system is 100 meters for a perfectly reflecting retrodirective target. For bottom-located objects such as sunken vessels and mines or natural underwater objects, the maximum range is about 70 meters. A laser could theoretically extend the range to 270 meters for a perfect target. The most satisfactory available light source is a capacitor-discharge air arc for which no shuttering device is needed. The video tube should be an intensifier orthicon capable of providing a resolution of about 250 lines for an input of 10 to the 9th power lumen per sq. cm. The problems of sea-water luminescence are found to be trivial. (Author)

AD-291 713 Div. 8, 2
(TISTP/JW) OTS price $3.50

RCA Defense Electronic Products, Moorestown, N. J.
ELECTRODELESS MHD GENERATOR RESEARCH. PART I. THEORETICAL ANALYSIS.
Final rept.,
by J. B. Fanucci, L. J. Kijewski and others.
Oct 62, 204p. incl. illus. table, 19 refs.
(Contract AF 33(616)7913, Proj. 8173)
(ASD TDR 62-411, pt. 1)
Unclassified report

DESCRIPTORS: *Plasma physics, *Magnetohydrodynamics, *Induction generators, Impedance, Fluid flow, Heat transfer, Viscosity, Low frequency, Subsonic flow, Cooling, Ferromagnetic materials, Electrodes.

The theoretical investigation encompassed both the electrodynamic and gas dynamic aspects of the A.C. MHD generator and their relationship to each other. The following areas of investigation are included: generator impedance, side losses, fringing effects, channel flow, heat transfer, plasma viscosity, operating conditions, and starting transients. Parametric studies are included for several of the above-mentioned topics. The result of the above studies has led to the design of an experimental generator. The addition of a ferromagnetic material external to the generator improves the power factor characteristics. Power factors up to 0.4 are possible at low frequencies. Supersonic rather than subsonic operation of the generator yields the higher power densities. Fringing effects indicate the need for shading magnetic fields analogous to DC generators. Heat protection of the A.C. MHD generator walls by transpiration cooling is feasible. (Author)

AD-291 729 Div. 8
(TISTE/OHD) OTS price $6.60

Airborne Instruments Lab., Inc., Mineola, N. Y.
SUBMILLIMETER WAVE COMPONENT DEVELOPMENT,
by H. J. Hindin, J. J. Taub, and M. L. Wright.
Oct 62, 1v. incl. illus. 19 refs.
(Contract AF 30(602)2758, Proj. 5578)
(RADC TDR 62-536)
Unclassified report

DESCRIPTORS: *Microwave equipment, Extremely high frequency, Waveguide couplers, Radiofrequency attenuators, Phase shifters, Radar duplexers, Waveguides, Propagation, Prisms (Optics), Diffraction gratings.

Techniques for the design, construction, and evaluation of a 10-db directional coupler, a 0 to 40 db variable attenuator, a 90-degree phase shifter, and a duplexer to operate in the 300 to 1000 Gc region were investigated theoretically and experimentally. Quasi-optical techniques, oversize-waveguide, trough-guide, and Goubau beam guide were studied. Quasi-optical techniques used in oversize waveguide were emphasized for the development of components. Detailed theoretical analyses of this technique were made, and component design data is included. Construction of many components such as tapers and adapters was necessary because these items were not commercially available. (Author)

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-291 737 Div. 8
(TISTE/OHD) OTS price $4.60

Air Force Cambridge Research Labs., Bedford, Mass.
TUNNEL DIODES AT MICROWAVE FREQUENCIES,
by Gustav H. Blaeser. Sep 62, 41p. incl. illus. tables, 8 refs. (Rept. no. AFCRL 62-579)
(Proj. 4610)
Unclassified report

DESCRIPTORS: *Diodes, *Semiconductors, *Microwave equipment, Impedance, Electronic circuits, Complex variables, Mathematical analysis, Stability.

Tunnel diodes are very useful in circuits if their impedance and admittance, the region of stability, and their limitation of frequencies to operate with are known. The most important expressions for impedance and admittance as well as their derivations leading to a polynomial equation are given to indicate the region of circuit stability. An impedance diagram is shown with arbitrary values as an example. Another diagram, with notes taken from the S - plane, showing the self-resonant frequency in the tunnel diode network as a function of the sum of generator, load, and diode series resistance demonstrates the behavior of the network. An equation for the extended self-resonant frequency in a series oscillator circuit is derived. The result of the evaluation is shown in two diagrams. (Author)

AD-291 748 Div. 8, 26
(TISTE/OHD) OTS price $2.60

Bliley Electric Co., Erie, Pa.
PRODUCTION ENGINEERING MEASURE. QUARTZ CRYSTAL UNITS CR-(XM-40)/U (2.5 MC HIGH PRECISION).
Quarterly progress rept. no. 5, 1 June-31 Aug 62,
by J. M. Wolfskill, R. T. Schlaudecker, and Robert Mouck. 31 Aug 62, 25p.
(Contract DA 36-039-sc-85958)
Unclassified report

DESCRIPTORS: *Crystal oscillators, *Manufacturing methods, *Standards, Quartz crystals, Aging, Tests, Test methods, Stability, Frequency, Production, Measurement, Test equipment, Frequency multipliers, Crystal ovens, Temperature.

The CR-(XM-40)/U are very high precision crystal units at 2.5 megacycles nominal frequency. It was known that the engineering sample units could meet all the requirements listed for the CR-(XM-40)/U by the governing SCS-91 specification. The obstacle which prevented formal preproduction testing of sample units was that the exact aging test prescribed by SCS-91 could not be performed successfully. SCS-91 demands that the CR-(XM-40)/U units attain a frequency aging stability of at least ±5 parts in 10 to the tenth per day after three weeks at operating temperature. It further demands that compliance with this requirement be shown by daily measurements of stability. This means that the aging evaluation arrangement must be able to isolate a change in crystal frequency of 5 parts in 10 to the tenth by simple comparison of consecutive daily measurements. Various attempts were made to perform the SCS-91 aging test. Test data are given which show how measurement errors distort their accuracy. A proposed method of computing the daily aging rate as an average value is given and why this method is necessary at the present time. (Author)

AD-291 765 Div. 8
(TISTE/OHD) OTS price $6.60

Electrical Engineering Research Lab., U. of Illinois, Urbana.
BACKWARD-WAVE RADIATION FROM PERIODIC STRUCTURES AND APPLICATION TO THE DESIGN OF FREQUENCY-INDEPENDENT ANTENNAS,
by P. E. Mayes, G. A. Deschamps, and W. T. Patton. Dec 62, 55p. incl. illus. tables, 10 refs. (Technical rept. no. 60)
(Contract AF 33(657)8460, Proj. 4028)
Unclassified report

DESCRIPTORS: *Antennas, *Broadband, Structures, Helical antennas, Electromagnetic waves, Design, Diffraction gratings, Analysis, Antenna radiation patterns, Brillouin zones, S band, X band, Theory.

A descriptive treatment of the various periodic structures has been made to illustrate the underlying principle. Although the relation between periodic structures and log-periodic structures has been emphasized, the usefulness of the periodic antenna itself should not be overlooked. Among the notable properties of periodic antennas are the frequency-scanning capability of some of these structures and the absence of sidelobes in the backfire mode. The Brillouin diagram was used as a tool in studying the performance of the closed periodic structures. An extension is made to open structures and an interpretation of the diagram for antennas is given. The backfire property is required of the periodic structure to allow tapering to a successful log-periodic antenna. A gain equivalent to the gain of a linear array of dipoles with Hansen-Woodyard excess phase shift has been obtained with a backfire bifilar helical antenna with a pitch angle of 45 degrees. Gains of this order should be obtainable with the log-periodic version of this antenna if an extremely slow rate of taper were used. In this way, high gain and large bandwidth antennas could be built, but at the expense of very large structures. (Author)

AD-291 766 Div. 8
(TISTE/OHD) OTS price $4.60

Electrical Engineering Research Lab., U. of Illinois, Urbana.
ANTENNA IMPEDANCE MATCHING BY MEANS OF ACTIVE NETWORKS,
by S. Laxpati and R. Mittra. Nov 62, 40p. incl. illus. table, 10 refs. (Technical rept. no. 64)
(Contract AF 33(657)8460, Proj. 4028)
Unclassified report

DESCRIPTORS: *Antennas, *Impedance matching, Antenna amplifiers, Broadband, Analysis, Electrical networks, Electronic circuits, Complex variables, Mathematical analysis, Noise (Radio), Radiofrequency power, Transistors.

Several schemes for wideband matching of impedances using active elements in the matching network are presented. A simple LC matching network may be designed using one active element if a certain approximation of the load impedance function is made. Illustrative designs using one and two active elements are described. The noise performance of an active matching circuit which has an infinite bandwidth in an ideal sense is compared with a simple active padding network. It is found that there is little relative advantage of one over the other. It is shown, however, that there is a definite advantage of the former circuit over the latter one if one compares their power performance. Experimental verification of the theoretical designs are included. (Author)

AD-291 780 Div. 8
(TISTE/OHD) OTS price $3.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
RF COMPONENT DEVELOPMENT FOR THE DICON SYSTEM,
by R. S. Berg and B. Howland. 3 Aug 62, 31p. incl. illus. tables, 3 refs. (Technical rept. no. 275)
(Contract AF 19(628)500)
(AFESD TDR 62-247) Unclassified report

DESCRIPTORS: *Band-pass filters, *Radiofrequency transformers, *Crystal mixers, Radiofrequency coils, Frequency shift keyers, Radio communication systems, Variable capacitors, Design, Magnetic cores, Power dividers, High frequency, Very high frequency.

Described are new RF circuit developments, including a band-pass filter with a trimming-condenser arrangement that greatly facilitates alignment, an RF distribution transformer, and various designs for wide-band RF hybrid-junction and balanced-mixer circuits. The design of a wide-band, electrostatically shielded toroidal transformer is also reported, with special emphasis on its application in the development of hybrid-junction and balanced-mixer circuits. Finally, the mechanical arrangement for combining the modular circuits in the DICON System is outlined. (Author)

AD-291 781 Div. 8
(TISTE/OHD) OTS price $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
A LUNEBURG LENS AS A PASSIVE REFLECTOR FOR SATELLITE COMMUNICATION,
by R. N. Assaly. 21 Aug 62, 27p. incl. illus. tables, 8 refs. (Technical rept. no. 277)
(Contract AF 19(628)500)
(AFESD TDR 62-248) Unclassified report

DESCRIPTORS: *Satellite vehicle antennas, *Lens antennas, *Microwave communication systems, Communication systems, Antenna radiation patterns, Electromagnetic wave reflections, Propagation, Wave transmission, Wave analysis, Analysis.

A specially designed Luneburg lens used as a passive communication satellite in a stationary orbit refracts the energy incident upon it through an angle of 165 to 180 degrees, thus providing a wavefront propagating back in the general direction from which the signal came. Two formulas for the scatter pattern are developed -- one approximate, the other accurate. Thus, it is possible to compute values for a minimum lens size that will provide adequate signal return in a radar range. The composition of the lens must take into account the required dielectric constant distribution and yet be sufficiently light in weight. Several such compositions are discussed. (Author)

AD-291 787 Div. 8, 2, 6
(TISTE/OHD) OTS price $3.60

Naval Ordnance Test Station, China Lake, Calif.
AN ANGULAR TRACKING DRIVE FOR A RADIO TELESCOPE OF UNCONVENTIONAL DESIGN,
by John M. Boyle. Dec 62, 30p. incl. illus. refs. (NOTS TP 3086)
(NAVWEPS rept. no. 8071) Unclassified report

DESCRIPTORS: *Radio astronomy, *Telescope mounts, *Telescopes, *Antennas, *Tracking telescopes, Parabolic antennas, Epoxy resins, Expanded plastics, X band, Mechanical drives, Bearings, Floating bodies, Control valves, Valves, Jets, Gas flow, Jet propulsion, Torque, Servomechanisms, Servo systems, Analog systems, Computers, Simulation.

A description is given of the reflector support and drive system for a large radio telescope of unconventional design. The telescope consists of a hollow sphere supported in a hydrostatic bearing formed by a concave socket filled with water. A simple system of water pressure pads driven by a positive displacement pump keeps the sphere centered in the socket. The drive system consists of a pulsed air jet or rocket motor that rotates about the axis of the telescope directly in front of the feed antenna. The drive system is unique in that it is independent of the orientation of the telescope with respect to the earth. The theoretical and experimental portions of this report analyze the performance of the drive system of a two-foot-diameter model which automatically tracks an X-band source. (Author)

AD-291 789 Div. 8
(TISTE/OHD) OTS price $1.60

Navy Electronics Lab., San Diego, Calif.
EXPERIMENTAL, LUMPED-ELEMENT, TAPERED, M-DERIVED FILTER TRANSFORMERS.
Research and development rept.,
by J. R.Potthoff. 21 Aug 62, 14p. incl. illus.
(NEL rept. no. 1131)
Unclassified report

DESCRIPTORS: *Radiofrequency transformers, *Antenna couplers, Low-pass filters, Impedance matching, High frequency, Low frequency, Electrical networks, Standing-wave ratios.

A proposed shipboard transmission system involved the connection of transmitters covering the 1f and 2-6 mc/s bands for simultaneous operation on a common antenna through available complementary filters. A broadband transformer was required to perform the necessary impedance transformation between transmitter and filter at a power level of 2500 watts. The approach given here concerns the design and analysis of eleven- and thirteen-element, linearly tapered, M-derived, low-pass-filter, lumped-element transformers. The results of tests conducted on an experimental model of an eleven-element transformer constructed of receiver-type components are compared with the analytical data. (Author)

AD-291 820 Div. 8
(TISTE/CRJ) OTS price $3.60

University of Southern Calif. Engineering Center, Los Angeles.
THE EXTERNAL FIELD PRODUCED BY AN ARBITRARY SLOT ON A DIELECTRIC COATED ELLIPTIC CYLINDER.
Technical rept.,
by Cavour W. H. Yeh. Sep 62, 28p. incl. illus. 16 refs. (USCEC rept. no. 82-206; EE-16)
(Contract AF 19(604)6195, Proj. 4642)
(AFCRL 62-781) Unclassified report

DESCRIPTORS: *Slot antennas, *Antenna radiation patterns, *Electromagnetic fields, *Cylindrical bodies, Dielectrics, Electric fields, Magnetic fields, Mathematical analysis, Integrals, Plasma physics, Partial differential equations, Special functions.

Expressions are derived for the external electromagnetic field produced by an arbitrary slot on the conducting surface of a dielectric coated elliptic cylinder of infinite length. It is assumed that the electric field tangential to the slot is a prescribed function. Boundary conditions are satisfied using the orthogonality

characteristics of Mathieu functions. The integrals in the formal solution are evaluated by the saddle point method for the far zone fields. These far zone field solutions are then specialized to thin circumferential and axial slots. Illustrative numerical computations for the far zone field of thin axial slot are carried out. (Author)

AD-291 824 Div. 8
(TISTE/CRJ) OTS price $3.00

Westinghouse Electric Corp., Elmira, N. Y.
HIGH RESOLUTION CATHODE RAY TUBE.
Final rept.,
by H. Moss, E. Atti and others. Oct 62, 163p. incl. illus. tables, 24 refs.
(Contract AF 33(616)6219, Proj. 4156)
(ASD TDR 62-739) Unclassified report

DESCRIPTORS: *Cathode ray tubes, *Electron optics, Electron guns, Theory, Mathematical analysis, Space charges, Electron beams, Deflection, Focusing, Magnetic fields, Electrostatics, Cathode ray tube screens, Display systems, Transformations, Phosphors, Errors, Measurement, Reduction.

The general design and construction details are presented of a 5 in. diameter ultra high resolution CRT yielding a spot of .0005 in. diameter at the half power points with a beam current of 5 microamperes. It is shown that the performance achieved is almost certainly being limited by aberrations in the final lens system and/or by the screen grain structure. There is reason to feel that a spot diameter of about 0.2 mil may be obtainable simply by substituting an evaporated phosphor and a larger final lens system. It discusses the design of elaborate test equipment, using the principle of slit scanning, to measure these spot sizes accurately. A general theory is developed of narrow angle cathode ray tube design which is applicable to any similar problem. This theory is applied to study the limitations in cathode ray tube performance set by the maximum permissible cathode loading, by the beam space charge, by deflection defocussing, and by constructional difficulties. (Author)

AD-291 831 Div. 8, 25
(TISTM/ODN) OTS price $1.10

Westinghouse Electric Corp., Baltimore, Md.
ELECTROLUMINESCENT FERROELECTRIC (ELF) SOLID STATE DISPLAY.
Quarterly interim development rept. no. 18, 1 Sep-30 Nov 62.
30 Nov 62, 6p. incl. illus. table.
(Contract NObsr-72782, Proj. NE09 1600-836-2)
Unclassified report

DESCRIPTORS: *Display systems, *Switches, *Ferroelectric materials, *Luminescent materials, Laminates, Manufacturing methods, Sandwich construction, Tests, Ceramic materials, Switching circuits, Electronic switches.

Contents:
Ionic switches
Electrostrictive switches
Ceralectric cells
Ferroelectric structure test
Ionic switch tests
Sandwich fabrication
Sandwich evaluation

AD-291 832 Div. 8, 26
(TISTE/CRJ) OTS price $4.60

Westinghouse Electric Corp., Philadelphia, Pa.
PRODUCTION ENGINEERING MEASURE TYPE 2N1016B SILICON ALLOY TRANSISTOR.
Quarterly progress rept. no. 1,
by S. Chinowsky, T. Csakvari and others.
30 Sep 62, 48p. incl. illus. tables.
(Contract DA 36-039-sc-86743)
Unclassified report

DESCRIPTORS: *Transistors, *Manufacturing methods, Silicon alloys, Semiconductors, Production, Reliability, High temperature research, Thermal stresses.

A program aimed at improved reliability of high power silicon alloy transistors is described. Phases of the project include redesign of some components of the device, refinement or redesign of processes, and improved control of fabrication and internal device environments. Definite improvement of the hard-solder assembly is demonstrated. A supporting program of reliability measurement by means of high-temperature storage step-stress testing is outlined. (Author)

AD-291 852 Div. 8
(TISTE/OHD) OTS price $2.60

ITT Industrial Labs., Fort Wayne, Ind.
RESEARCH AND DEVELOPMENT TO IMPROVE THE RESOLUTION OF IATRON DIRECT VIEW STORAGE TUBES.
Interim development rept., 23 Aug-22 Nov 62,
by R. H. Clayton. 15 Dec 62, 1v. incl. illus. table.
(Contract NObsr-87264, Proj. SR-00803)
Unclassified report

DESCRIPTORS: *Storage tubes, *Cathode ray tubes, *Image converter tubes, Electron lenses, Electron optics, Focusing, Cathode ray tube screens, Electrostatic fields, Digital computers, Simulation, Design.

This report includes:
CONSIDERATIONS ON THE USE OF A DIGITAL COMPUTER FOR IATRON RESOLUTION STUDIES; RELATIVE MERITS OF THE DIGITAL COMPUTER VERSUS ELECTRON-OPTICAL BENCH. by G. Papp. 1962, 10p. incl. illus. (Research memo. no. 368)

The electrostatic microlens approach to resolution improvement appears to hold promise. Analytical work including digital computer studies as well as electron optical bench analog work was continued. Practical techniques for fabrication of complex meshes were developed, and some measure of improvement has already been demonstrated in thick mesh tubes. (Author)

AD-291 872 Div. 8, 26
(TISTE/OHD) OTS price $2.60

Kuthe Labs., Inc., Newark, N. J.
PRODUCTION ENGINEERING MEASURE FOR A PHASE II SUPER POWER HYDROGEN THYRATRON TUBE.
Quarterly progress rept. no. 2, 7 June-6 Sep 62,
by H. E. Krefft. 6 Sep 62, 30p. incl. illus.
(Contract DA 36-039-sc-85985)
Unclassified report

DESCRIPTORS: *Thyratrons, *Discharge tubes, *Manufacturing methods, Production, Cathodes (Electron tubes), Cooling, Electrodes, Hydrogen, Anodes (Electron tubes), Structures, Radiofrequency power, Hydrogen.

A satisfactory solution was found for the construction and method of assembly of the anode

and control grid cooling jackets. Designs of a planar cathode which has circular vanes, an O.D. of 4 1/4 inches, and a coated surface area of 550 square centimeters, and of a hydrogen reservoir were finished. No essential changes were made in the other electrode assemblies or in the method of assembly of the tube. The construction of three tubes was initiated. (Author)

AD-291 876 Div. 8, 26
(TISTE/OHD) OTS price $4.60

Photocircuits Corp., Glen Cove, N. Y.
MICROMINIATURE LAYERED PRINTED WIRING.
Quarterly rept. no. 1, 15 June-15 Sep 62,
by G. Messner, R. McCaw, and M. Paluszek.
15 Sep 62, 26p. illus. tables.
(Contract DA 36-039-sc-90763, Proj. 3A99-15-002)
Unclassified report

DESCRIPTORS: *Printed circuits, *Microminiaturization (Electronics), *Manufacturing methods, Chemical milling, Photoengraving, Copper, Sandwich construction, Laminates, Metal films, Plating, Pictures, Gels.

An investigation of thin line etching was made and the spray etching technique has been selected as most satisfactory from the standpoint of accuracy and relative economy. With this technique, copper conductors 0.010 inch wide can be etched in any copper foil thickness if proper artwork compensation is made for the loss of line width during etching. Thorough investigation of the preheat period of the laminating cycle was made. A four minute time period for this preheating has produced the most satisfactory results within the practical range of multilayer board thickness. The importance of moisture exclusion from the individual layers prior to lamination is discussed. An electroless metallizing process has been selected for the manufacture of multilayer circuitry. (Author)

AD-291 877 Div. 8, 2
(TISTP/JW) OTS price $4.60

Oregon State U., Corvallis.
INVESTIGATION OF INSTRUMENTATION AND TECHNIQUES FOR ARMY WEATHER OBSERVATION.
Quarterly progress rept. no. 2, 1 May-31 July 62,
by Laurence D. Mendenhall, Kenneth H. Shreeve, and James W. Sears. 31 July 62, 34p. incl. illus. 27 refs.
(Contract DA 36-039-sc-89186, Proj. 3A99-27-005-07, Continuation of Contract DA 36-039-sc-78918)
Unclassified report

DESCRIPTORS: *Meteorological radar, *Radar pulses, Radar echo areas, Analysis, Precipitation, Oregon, Instrumentation.

Analysis of data collected by Weather Radar Set AN/CPS-9 during 1961 and 1962 resulted in the production of two case studies on orographic precipitation. The staff investigated several techniques of analysis for evaluation of echo characteristics revealing orographic effects. Results of this analysis show some distinct characteristics of orographic precipitation. Echo appears to form on the windward side of the Coast and Cascade Ranges but dissipated markedly in passing over the Willamette Valley. A study to determine the location of first appearance of echo in a post-cold frontal situation showed that 72% of the 206 echoes studied formed onshore and the remainder offshore. A re-examination of the experience gained by OSU researchers and others elsewhere indicates the desirability for establishing a comprehensive program for automation of the AN/CPS-9 in order to increase its efficiency and versatility in recording meaningful meteorological data. (Author)

AD-291 893 Div. 8, 24, 26
(TISTE/OHD) OTS price $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
PREPARATION OF ACTUAL-SIZE PRINTED WIRING LAYOUTS,
by E. A. Guditz. 4 Dec 62, 6p. illus. 5 refs.
(Rept. no. 51G-6)
(Contract AF 19(628)500)
(AFESD TDR 62-252) Unclassified report

DESCRIPTORS: *Printed circuits, *Manufacturing methods, Photography, Photographic plates, Collimators.

Difficulties encountered in maintaining accurate registration between layers of multilayer printed wiring cards has resulted in a method of preparing artwork actual size instead of by the usual enlarged artwork-photoreduction procedure. Fundamental to the approach is the fact that precise placement of lands, or pads, is more important than exact positioning of etched conductors. Accurate (±0.001 inch) land location is assured by jig-boring land-size holes in sheet metal (Invar) and contact printing the hole pattern (lands) onto a glass photographic plate. Conductor paths are added using narrow (0.016 inch min.) black crepe printed-wiring layout tape. Press-type transfer letters and numbers are added as required for titles or identification. Final artwork is formed by projection-printing the composite artwork onto another photographic plate using collimated light. Laboratory use of the technique has been successful in eliminating registration difficulties with 8 x 15 inch multilayer printed-wired cards. (Author)

9. FLUID MECHANICS

AD-291 220 Div. 9
(TISTA/GEC) OTS price $3.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
ON THE BASE FLOW CHARACTERISTICS OF BLUNT AND SLENDER BODIES,
by K. S. Wan. Nov 62, 31p. incl. illus. tables, 3 refs. (Rept. no. R62SD96)
(Contract AF 04(647)617)
Unclassified report

DESCRIPTORS: *Blunt bodies, *Conical bodies, *Cylindrical bodies, Spheres, Axially symmetric flow, Wake, Boundary layer, Mathematical analysis, Hypersonic flow.

An approximate method of solution is presented, which determines the location of the rear stagnation point in the viscous base flow region together with the size of the viscous wake and the flow characteristics there. This is useful and necessary in obtaining the initial conditions for the near wake calculations. In general, the results obtained show that one must consider the finite boundary layer at the base in determining the location of the rear stagnation point and the viscous wake width there. The viscous wake at the rear stagnation

point most likely consists of a shell of hot gas surrounding a cool core. Results of both blunt and slender bodies under hypersonic conditions are then compared and discussed. (Author)

AD-291 443 Div. 9
(TISTA/GEC) OTS price $4.60

Aerospace Corp., Los Angeles, Calif.
GENERALIZED LAMINAR BOUNDARY LAYER IN THREE DIMENSIONAL FLOW,
by S. W. Liu. 1 Sep 62, 40p. incl. illus. 26 refs. (Rept. no. TDR-169(3230-12)TN-1)
(Contract AF 04(695)169)
(SSD TDR 62-101) Unclassified report

DESCRIPTORS: *Laminar boundary layer, Compressible flow, Blunt bodies, Conical bodies, Supersonic flow, Gas flow, Aerodynamics, Theory, Mathematical analysis, Heat transfer.

A new approach to the three-dimensional boundary layer problems is proposed. The similarity concept is generalized for three-dimensional laminar flows whenever more than one velocity component exists in the inviscid flow field immediately outside of the boundary layer. For each boundary layer flow component similarity is established separately, each appropriate to the nature of the corresponding inviscid velocity component at the outer edge. For the purpose of solving simultaneous differential equations, a single independent variable can be adopted, which is considered merely as a mathematical convenience. Two examples of immediate practical interest are chosen with which derivations are presented for compressible flow using the proposed scheme. They are the general blunt-body stagnation point flow and the stagnation line flow of a supersonic cone at angle of attack. It has been demonstrated by the examples that consistent formulation can be obtained without the restriction of a single similarity variable. By comparison, formulation of the same problems based on a single similarity variable are constrained to the flow component upon which the similarity is based, and such formulations are consistent only when this component is the predominant one of the problem. (Author)

AD-291 444 Div. 9
(TISTA/GEC) OTS price $5.60

Aerospace Corp., Los Angeles, Calif.
ELECTRICAL CHARACTERISTICS OF COUETTE AND STAGNATION BOUNDARY LAYER FLOWS OF WEAKLY IONIZED GASES,
by Paul M. Chung. 1 Oct 62, 52p. incl. illus. 20 refs. (Rept. no. TDR-169(3230-12)TN-2)
(Contract AF 04(695)169)
(SSD TDR 62-119) Unclassified report

DESCRIPTORS: *Gas ionization, Blunt bodies, Mathematical analysis, Viscosity, Electrical properties, Recombination reactions, Electric potential, Ionic current, Theory, Compressible flow, Turbulent boundary layer.

The electrical behavior of weakly ionized compressible gases flowing along a solid boundary is studied. Analysis is made for flows wherein the range of electrical effects is much greater than the mean free path. Exact solutions are obtained by digital computer for Couette flows. A simple method is derived which gives accurate results when the ratio of the viscous layer thickness to Debye shielding length is large. The simple method derived for the Couette flow is extended to stagnation boundary layer flows for two-dimensional and axisymmetric blunt bodies. The method is shown to be readily usable for plasma diagnostics for a range of test conditions in laboratories. The general effects are discussed of gas phase recombination and of electron temperatures that are different from the gas temperatures with regard to the electrical characteristics of the ionized gas. (Author)

AD-291 445 Div. 9
(TISTA/GEC) OTS price $6.60

Boeing Scientific Research Labs., Seattle, Wash.
ON AXIALLY SYMMETRIC WAVES IN LINEARIZED COMPRESSIBLE FLOW,
by J. W. Craggs. Aug 62, 65p. incl. illus. 7 refs. (Mathematical note no. 273; Document no. D1-82-0205)
Unclassified report

Also available from the author.

DESCRIPTORS: *Compressible flow, Sound, Sound transmission, Wave transmission, Acoustics, Mathematical analysis, Equations, Motion, Gas flow, Boundary layer, Conical bodies, Supersonic flow, Fluid flow, Axially symmetric flow.

Considerable progress in the solution of two-dimensional, unsteady, wave problems has been made by the use of basic solutions with dynamic similarity, in which length and time are involved only in the combination (length - time) with the dimensions of velocity. This technique may be extended to cover problems in axially symmetric motion. The method is established, and is illustrated by reference to some problems in the motion of a compressible fluid, simplified by the use of the acoustic approximation, in which density variations are assumed to be so small that the linearization of the equations of motion is admissible. (Author)

AD-291 458 Div. 9, 25
(TISTP/JW) OTS price $4.60

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
DYNAMIC SQUARENESS IN POLYCRYSTALLINE GARNETS,
by B. W. Lovell and D. J. Epstein. Nov 62, 15p. incl. illus. (Technical rept. no. 173)
(Contracts AF 19(604)5482 and Nonr-184110, Proj. NR-018-801)
Unclassified report

DESCRIPTORS: *Magnetic fields, *Ferromagnetic materials, Crystals, Garnet, Damping, Diffusion, Stability, Velocity, Dynamics.

This report includes:
DYNAMIC BEHAVIOR OF DIFFUSION-DAMPED FERROMAGNETIC DOMAIN WALLS,
by James F. Janak. Nov 62, 32p. (Technical rept. no. 174)
(Contracts AF 19(604)5482 and Nonr-184110, Proj. NR 018-801)

AD-291 462 Div. 9
(TISTA/GEC) OTS price $7.60

Sperry Gyroscope Co., Great Neck, N. Y.
RE-ENTRY STABILITY AND TRAJECTORY ANALYSIS FOR A CONICAL VEHICLE,
by R. Vaccaro and P. Zove. Oct 62, 51p. incl. illus. tables, refs. (Rept. no. CA-4291-0065)
(Contract AF 04(694)28)
(BSD TDR 62-315) Unclassified report

DESCRIPTORS: *Conical bodies, *Re-entry vehicles, *Guided missile noses, Guided missile trajectories, Spin, Theory, Mathematical analysis, Computers, Programming, Drag, Re-entry aerodynamics, Stability.

A slender conical vehicle was analyzed to determine its suitability during the re-entry phase. Both theoretical analyses and a six-degree-of-freedom computer program were used in the study. Angle of attack convergence and time histories of the various trajectory parameters are presented. The effects of static margin, radius of gyration, and initial spin rate on the convergence envelope were also considered. A complete description of the computer program is included. (Author)

AD-291 550 Div. 9, 15
(TISTP/JW) OTS price $2.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
FILTERS WITH POLES HAVING EQUAL VERTICAL SPACING,
by R. I. Disman and S. Deutsch. 24 Sep 62, 12p. illus. 5 refs. (Rept. no. PIBMRI 1077-62)
(Grant AF-AFOSR-62-295)
Unclassified report

DESCRIPTORS: *Amplitude modulators, *Polarizing filters, Pulse analyzers, Impedance, Circuits, Transformations (Mathematic), Distribution, Polarization, Transients.

In the Butterworth criterion for maximally flat low-pass amplitude response, the poles are spaced by equal angles on a unit circle in the left hand s-plane. This configuration does indeed give a good cut-off in filters but at the expense of the transient response. The poor transient response is due to the poles which approach the j-axis; their specific contributions will be described mathematically. The above problem was considered when a filter was needed to give a band-limited output to an input of sampling pulses. The poles were placed on the unit circle, with equal vertical spacing, so as to try to compromise between good cut-off and acceptable transient response. (Author)

AD-291 596 Div. 9
(TISTA/GEC) OTS price $5.60

St. Anthony Falls Hydraulic Lab., U. of Minn., Minneapolis.
A NOTE ON THE LINEAR THEORY OF TWO-DIMENSIONAL SEPARATED FLOWS ABOUT THIN BODIES,
by C. S. Song. Aug 62, 48p. incl. illus. tables, 11 refs. (Technical paper no. 39, Series B)
(Contract Nonr-71024, NR 062-052)
Unclassified report

DESCRIPTORS: *Gas flow, Aerodynamic configurations, Integral equations, Airfoils, Hydrofoils, Wake, Cavitation, Mathematical analysis, Wedges, Tails, Theory, Boundary layer, Equations, Separation.

By using a generalized method of solution for the mixed boundary value problem of analytic function theory, and by comparing the present method with the method of source-sink distribution and the method of analytic continuation, an attempt is made to unify the seemingly divergent development of the linear theories of thin foils with separating flows. It is shown that most of the mathematical models may be regarded as special cases of a generalized Riabouchinsky model. The admission of a singularity, which is characteristic of the linear theory, introduces an arbitrary constant and hence the solution is generally non-unique. Therefore, it is always necessary to use additional conditions which are normally not required if exact theory is used. The number of the additional conditions required is equal to the number of singularities admitted. The solution can be made unique, however, by requiring that the solution must be sectionally continuous on the boundary and bounded at infinity. By admitting a singularity at a separation point, the model will represent a flow wherein the free streamline separates normally from the solid boundary. (Author)

AD-291 599 Div. 9
(TISTA/GEC) OTS price $2.60

Naval Ordnance Test Station, China Lake, Calif.
SUMMARY OF RESULTS OF PRESSURE COEFFICIENT CALCULATIONS FOR A SPHERICAL TIPPED TANGENT-OGIVE BODY,
by Kinge Okauchi. Oct 62, 22p. incl. illus. table, 7 refs. (NOTS TP 3050)
(NAVWEPS rept. no. 8048)
Unclassified report

DESCRIPTORS: *Ogives, *Spheres, Mathematical analysis, Theory, Aerodynamic configurations, Load distribution, Model tests, Wind tunnel models, Conical bodies, Cylindrical bodies, Guided missile noses, Pressure.

A review of the results obtained in preliminary work conducted by the Naval Ordnance Test Station to develop procedures for the calculation of pressures on practical body shapes using currently available theories and computing methods is presented. A comparison of the calculated results with experimental data is made to check the validity of the procedures. (Author)

AD-291 623 Div. 9
(TISTP/WH) OTS price $4.60

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
APPROXIMATE ANALYTICAL DESIGN OF A CLASS OF SUPERSONIC SIDE INLETS AND EXITS,
by Henry W. Woolard. Aug 62, 30p. illus. 20 refs. (Rept. no. TG-445)
(Contract NOw 62-0604-c)
Unclassified report

DESCRIPTORS: *Supersonic flow, *Compressible flow, *Duct inlets, *Fluid mechanics, *Gas flow, Design.

Simple approximate analytical relations are given for the duct contours for the flow of an inviscid compressible gas through a special class of plane and cylindrical supersonic side inlets and exits for which the internal flow is isentropic or nearly isentropic. The ducts treated are formed by joining a reverse or forward Prandtl-Meyer flow region to a radial sink or source flow by means of a transition region. For this special class of ducts, a greater degree of freedom is achieved in the choice of certain duct dimensions than is possible by the more obvious method of selecting a pair of streamlines from the flow in a wind-tunnel nozzle or a contoured rocket-exhaust nozzle designed by one of the many methods available in the literature. In the case of cylindrical ducts, the increased freedom in the selection of some of the duct dimensions is accomplished at a sacrifice in the allowable duct height as a consequence of an approximation made in the analysis. (Author)

AD-291 662 Div. 9, 30
(TISTA/SEB) OTS price $2.25

Florida U. Engineering and Industrial Experiment Station, Gainesville.
RESEARCH AND DEVELOPMENT ON INDUCTION HEATING METHODS OF SIMULATING AERODYNAMIC HEATING.
Final rept.
Oct 62, 71p. incl. illus.
(Contract AF 33(616)5703, Proj. 1347)
(WADC TR 59-523, pt. 4)
Unclassified report

DESCRIPTORS: *Aerodynamic heating, *Induction heating, Airframes, Water coolers, Surface temperatures, Plasma jets, Resistance, Voltage, Coils, Thermal insulation, Design, Radiofrequency oscillation, Density, Intensity, Electric currents, Theory, Mathematical analysis, Tests, Test methods, Voltage, Liquid cooled, Simulation, Radiofrequency coils.

Radio-frequency induction heating as a means of simulating aerodynamic heating was studied. The techniques used to increase the deliverable surface-power density are discussed with particular emphasis on the capabilities and limitations on the use of water-cooled tubing for work coils. Methods of surface heating materials with very high electrical resistivities are discussed. The possibility of using an induction-coupled plasma torch for aerodynamic heating simulation is explored and the results of some preliminary tests with this type of torch are presented. The problem of voltage breakdown between a heated specimen and an air-spaced work coil is investigated, as influenced by spacing, coil configuration, magnetic field, and specimen temperature up to 2500 F. The results of voltage breakdown tests on commercially available materials which can be used as solid insulation between a work coil and a heated specimen at 3000 F are presented. (Author)

AD-291 677 Div. 9, 25
(TISTP/JW) OTS price $2.25

ITT Industrial Labs., Fort Wayne, Ind.
INVESTIGATION OF CLOSE-SPACED THERMIONIC CONVERTER.
Final rept., 15 Dec 60-25 June 62,
by Donald K. Coles. Oct 62, 77p. incl. illus. tables, 12 refs.
(Contract AF 33(616)7683, Proj. 8173)
(ASD TDR 62-687) Unclassified report

DESCRIPTORS: *Generators, *Diodes, *Servomechanisms, Thermionic emission, Thermal expansion, Cathodes, Anodes, Barium.

Difficulties in realizing a very small anode-cathode spacing, due to uneven thermal expansion and warping, have led to a feasibility study of a subliming anode surface that automatically maintains the proper spacing from the cathode. Barium was chosen as a subliming metal since it serves also to activate the cathode. This required that all parts of the vacuum enclosure be held above 500 degrees C. Effects of barium corrosion at high temperatures were studied. Four test models were made and tested. By holding the temperature of the barium reservoir constant and varying the cathode temperature, the maximum of the Taylor-Langmuir emission S-curve was repeatedly traversed. Starting with an anode-cathode spacing of 0.007 inch and a heated barium reservoir, the spacing was reduced by build-up of barium on the anode. A metallic connection between anode and cathode then developed. This was removed by rising the cathode above 1000 degrees C and the anode above 500 degrees C. The characteristic thermionic current-voltage curves were then seen again, but with currents 12 times larger than those obtainable with the original spacing. This proved that build-up of barium had reduced the anode-cathode spacing. Since the temperature distribution in the anode was non-optimum, suggestions are made for further studies with improved anode design. (Author)

AD-291 683 Div. 9, 7
(TISTP/GRW) OTS price $1.00

ITT Federal Labs., Nutley, N. J.
POWER CONVERSION BY ELECTRON CONVECTION.
Final rept., Apr 61-June 62,
by S. R. Hoh and W. L. Harries. Oct 62, 32p. incl. illus. tables, 6 refs.
(Contract AF 33(616)7941, Proj. 8173)
(ASD TDR 62-693) Unclassified report

DESCRIPTORS: *Electric power production, *Thermionic emission, *Electrons, Conversion ratio, Magnetohydrodynamics.

A preliminary research study was conducted on a new electrohydrodynamic system which is capable of converting thermal into electrical power. Conversion was accomplished by the forced convection of thermionic electrons emitted from an alkaline metal emitter. Analytical and experimental studies showed that this new type of converter is feasible and practical. Outputs up to 18 volts were obtained under open circuit condition with emitter temperatures as low as 450 C. Short circuit output currents were near the emission current of the emitter. (Author)

AD-291 716 Div. 9, 25
(TISTM/EJH) OTS price $2.60

RAND Corp., Santa Monica, Calif.
HEAT AND MASS EXCHANGE WITH COOLING OF STRONGLY HEATED SURFACES BY EVAPORATION,
tr. by Joy B. Gazley. Nov 62, 18p. incl. illus. 16 refs. (Memo. no. RM-2997-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Gas flow, *Kinetic theory, *Gas diffusion, *Thermal conductivity, Heat transfer, Transport properties, Cooling, Surfaces, Boundary layer, Evaporation, Liquids, Gases, Films, Air, Water, USSR, Translations, Theory.

Criterial equations of heat and mass transfer are deduced, which take into account the inter-effect of the flows of heat and steam across the boundary layer and the effects of Stefan's flow on the values of the coefficients of thermal conductivity and diffusion. The temperature and liquid flow rate, determined by the aid of these equations, are compared with experimental and theoretical data given by other authors. (Author)

AD-291 717 Div. 9, 25
(TISTM/EJH) OTS price $2.60

RAND Corp., Santa Monica, Calif.
HEAT EXCHANGE WITH A FLOW OF A RAREFIED GAS ALONG A WALL,
tr. by Joy B. Gazley. Nov 62, 21p. incl. illus. tables, 13 refs. (Memo. no. RM-3016-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Supersonic flow, *Gas flow, *Heat transfer, *Superaerodynamics, Gases, Theory, Kinetic theory, Mathematical analysis, Hydrodynamics, Boundary layer, Translations, USSR.

A solution for the problem of supersonic flow of a rarefied gas along a wall with slip is obtained. The result is deduced for the hydrodynamic and thermal boundary conditions which correspond to the problem. (Author)

AD-291 724 Div. 9, 12
(TISTA/GEC) OTS price $9.60

Sperry Gyroscope Co., Great Neck, N. Y.
FLOW-FIELD PROPERTIES ABOUT A HEMISPHERE-CONE RE-ENTRY BODY WITH 8.75 DEGREES SEMIVERTEX ANGLE.
Oct 62, 111p. incl. illus. tables, 23 refs.
(Rept. no. CA-4291-0067)
(Contract AF 04(694)28)
(BSD TDR 62-317) Unclassified report

DESCRIPTORS: *Re-entry vehicles, *Guided missile noses, Blunt bodies, Conical bodies, Spheres, Atmosphere entry, Shock waves, Boundary layer, Velocity, Pressure, Temperature, Density, Enthalpy, Electrons, Gas flow, Aerodynamic data, Mathematical analysis, Compressible flow, Viscosity, Re-entry aerodynamics.

Thermodynamic and electron flow-field properties are computed for the shock-layer region of a blunted cone re-entry body with an 8.75 degree semivertex angle. Five re-entry conditions are considered, these being at altitudes of 50,000, 100,000, 150,000, 200,000, and 250,000 feet. The shock layer is treated in two parts: a boundary layer and an inviscid region. The properties presented therein are velocity magnitude, pressure, temperature, density, enthalpy, weak-field electron collision frequency, strong-field electron collision frequency, and electron density. (Author)

AD-291 756 Div. 9
(TISTA/FRL) OTS price $5.60

Davidson Lab., Stevens Inst. of Tech., Hoboken, N. J.
HYDROFOIL FLUTTER PHENOMENON AND AIRFOIL FLUTTER THEORY. VOLUME II. CENTER OF GRAVITY LOCATION,
by Charles J. Henry and M. Raihan Ali. July 62, 54p. incl. illus. table, 4 refs. (Rept. no. R-911)
(Contract NObs-84500)
Unclassified report

DESCRIPTORS: *Hydrofoils, *Airfoils, Hydrodynamics, Aerodynamics, Aerodynamic configurations, Tests, Theory, Mathematical analysis, Equations, Motion, Elasticity, Damping, Test equipment, Frequency, Flutter.

Measured hydrofoil flutter speeds did not agree with those predicted using aeroelastic flutter theory for a two degree of freedom system in two-dimensional flow. The predicted asymptotic behavior of flutter speed with decreasing density ratio was confirmed experimentally but at lower values. Discrepancies were found between the measured and predicted decay rates from an initial disturbance at and below the flutter speeds, whereas the measured and predicted response frequencies and complex amplitude ratios were in agreement in all cases. This observation, together with calculations partially substantiated the hypothesis that the added mass forces are more accurately represented by the presently used theories than are the circulatory forces. (Author)

AD-291 760 Div. 9
(TISTA/GEC) OTS price $2.60

Brown U. Div. of Applied Mathematics, Providence, R. I.
ON THE STABILITY OF VISCOUS FLOW BETWEEN ROTATING CYLINDERS. III. THE EFFECT OF A TRANSVERSE PRESSURE GRADIENT,
by T. H. Hughes and W. H. Reid. Nov 62, 27p. incl. illus. tables, 5 refs. (Technical rept. no. 50)
(Contract Nonr-56207, Proj. NR-062-179)
Unclassified report

DESCRIPTORS: *Gas flow, Cylindrical bodies, Pressure, Stability, Turbulent flow, Aerodynamics, Aerodynamic data, Functions, Mathematical analysis, Equations, Viscosity, Rotating structures.

The effect of a transverse pressure gradient on the stability of Couette flow has been studied by direct numerical integration of the governing equations. For particular values of the rotation rate and pressure gradient it is found that the curve of neutral stability has two minima and this leads to discontinuous behavior of the critical value of the wave-number. Detailed results for both the eigenvalues (Taylor number and wave-number) and the eigenfunctions (radial and transverse components of the perturbation velocity) are given for two rates of rotation: omega sub 2/omega sub 1 equals 0 and -1. (Author)

AD-291 784 Div. 9, 25
(TISTP/JW) OTS price $2.50

Ohio State U. Research Foundation, Columbus.
APPLICATION OF THE FAST CYCLOTRON WAVE OF A MAGNETICALLY FOCUSED ELECTRON BEAM TO FREQUENCY MULTIPLICATION.
Final rept., June 61-May 62 on Research and Development of a Fast Cyclotron Wave Frequency Multiplier,
by Shizuo Mizushina and Dean T. Davis. Nov 62, 115p. incl. illus. tables, 18 refs.
(Contract AF 33(616)8391, Proj. 1(7-4156)
(ASD TDR 62-720) Unclassified report

DESCRIPTORS: *Cyclotrons, *Electron beams, Frequency multipliers, Wave characteristics, Harmonic analysis, Microwaves, X-band, K-band, Magnetic field.

An electron beam focused by an axial magnetic field and subjected to a transverse high-frequency electric field has been used to produce power output at harmonic frequencies of the transverse electric field. The resulting rotating electron beam contains a slow and a fast cyclotron wave, and the fast wave interacts with a harmonic coupler to provide output at a frequency that is a multiple of the input microwave frequency. The resulting frequency multiplier has been investigated, and an analysis is provided of the effects of finite beam diameter, and of the efficiency of coupling of the electrons to both the input and the output couplers. A study of interaction circuits is provided and attention is given to limitations on interaction efficiency, including relativistic effects. A practical multiplier design is described and results of experimental work show that the basic theory is reasonably well confirmed in the conversion from X-band to K-band. (Author)

AD-291 803 Div. 9
(TISTP/TL) OTS price $2.60

RAND Corp., Santa Monica, Calif.
NOTE ON A HYPERSONIC TAIL-SHOCK PROBLEM,

by R. E. Meyer. Dec 62, 17p. incl. illus. 5 refs. (Memo. no. RM-3148-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Gas flow, *Hypersonic flow, *Projectiles, *Wake, *Shock waves, *Boundary layer, *Partial differential equations, Mach number, Pressure, Density, Differential equations, Deflection.

The formation of a shock by a steady gas stream converging toward an axis of symmetry is investigated. The flow is assumed to be a conical field with vertex at the point where the inner boundary of the stream first reaches the axis and where the shock starts. A detailed treatment is given for the case where the flow downstream of the shock is uniform, axial, and of large Mach number M, so that the semivertex angle Tau of the shock is small, but M Tau is not. It is also assumed that the shock is at least fairly strong. An additional small parameter then appears, and a uniform first-order approximation with respect to it is derived. The streamlines are found to be nearly straight and parallel, but the gas is found to suffer a precompression, upstream of the shock, such that the inner boundary of the inviscid gas stream is a vacuum line. Similarly, vacuum is approached asymptotically on all streamlines with distance upstream from the shock. It is shown that the result concerning the occurrence of vacuum must be expected to be independent of all but one assumption--that the gas impinges on the axis at a non-zero angle. Accordingly, tail-shock formation in two-dimensional and axially symmetrical flows must be expected to differ in significant, still-unknown ways. (Author)

10. FUELS AND COMBUSTION

AD-291 422 Div. 10
(TISTM/REB) OTS price $5.60

Thiokol Chemical Corp., Elkton, Md.
DEVELOPMENT OF SOLID ROCKET PROPELLANT SYSTEM CAPABLE OF WITHSTANDING EXTENDED STORAGE IN SPACE ENVIRONMENT.
Quarterly progress rept. no. 2,
by R. M. Brownell, J. C. Merges and others.
12 Dec 62, 55p. incl. illus. tables (Rept. no. E194-62)
(Contract AF 04(611)8188, Proj. 3059)
Unclassified report

DESCRIPTORS: *Solid rocket propellants, Radiation effects, Aging, Space environmental conditions, Vacuum apparatus, Low temperature research, Polymers, Urethanes, Combustion chamber liners, Storage.

Tentative results of the data indicate that the polyurethane-based propellant, TP-G-3129, appears to offer the best space storage performance. From the standpoints of weight loss and physical property change (hardening) under vacuum exposure this propellant exhibits the most desirable qualities, followed by the Minuteman and Dyna Soar propellants, TP-H-1011 and TP-H-1050. These formulations also show an ability to withstand aging as shown by sol-gel ratio analysis and modulus values. Under low temperature TP-H-1050 exhibits good tensile strength values. (Author)

AD-291 480 Div. 10, 4, 26
(TISTM/TCG) OTS price $15.00

Aerojet-General Nucleonics, San Ramon, Calif.
HYDRAZINE PROCESS DEVELOPMENT.
Interim technical progress rept. no. 6,
Aug-Oct 62,
by F. R. Standerfer, H. J. Snyder and others.
Oct 62, 274p. incl. illus. tables, 19 refs.
(Rept. no. AN-756)
(Contract AF 33(600)42996)
(ASD TR 7-840A, vol. 7)
Unclassified report

DESCRIPTORS: *Hydrazines, *Liquid rocket propellants, Industrial production, Processing, Atomic energy engineering, Homogeneous reactors, Fission products, Chemical reactions, Chemical analysis, Electron microscopy, Contamination, Instrumentation, Hazards, Colorimetric analysis, Ammonia, Uranium compounds, Amines, Fluorescence, Separation, Particles, Radiographic analysis, Polarographic analysis, Viscosity, Radioactive isotopes, Production.

This report discusses fission fragment distribution studies, colloidal UO2 preparation, improvements in U and N_2H_4 analytical techniques, in-reactor loop design modifications, fission fragment deposition measurements for a variety of sources, correlation of experimental heat transfer data, and a parametric reactor systems analysis. Gas disengagement development is essentially complete. Three methods were evolved for converting aqueous UO2 sols to colloidal UO2 dispersible in liquid NH_3. In-reactor loop design was modified to incorporate a compact equipment cubicle within the MTR biological shield. Polarographic analysis showed no uranium contamination in liquid samples filtered from LPTR irradiation capsules. Statistically reliable hydrazine G-values as high as 2.2 were obtained in recent LPTR runs. (Author)

AD-291 554 Div. 10
(TISTM/REB) OTS price $6.60

Armour Research Foundation, Chicago, Ill.
FUNDAMENTALS OF LIQUID PROPELLANT SENSITIVITY.
Final rept., 13 June 61-12 Sep 62,
by T. A. Erikson and E. L. Grove. 26 Nov 62,
1v. incl. illus. tables, 20 refs. (Rept. no. ARF 3197-15)
(Contract NOw 61-0603-c)
Unclassified report

DESCRIPTORS: *Liquid rocket propellants, *Nitroglycerine, Vaporization, Shock tubes, Test methods, Photolysis, Stability, Sensitivity, Detonation.

Parameters affecting the explosive sensitivity of liquid propellants are identified. With nitroglycerine as a representative propellant, background and experimental techniques were established for shock-tube and flash-irradiation tests. Results of the two tests were evaluated in terms of a time delay, measured from the reception of an initiating stimulus to a detonation identified by a characteristic reverberation signal. In the shock-tube tests, an incident shock into O at an intensity of Mach 4.6 caused the detonation of nitroglycerine within 30 microseconds after the shock had been reflected at the surface of the sample. Generally, the time delay varied inversely with the intensity of the shock. Delays ranging from near zero to about 500 microseconds were measured. Heat transfer calculations show that the surface temperature of the nitroglycerine increases by no more than 10 C under such shock exposure. In the flash-irradiation tests, nitroglycerine resting on a carbon black film detonated within

200 microseconds after receiving the output from a xenon-filled lamp excited at 4000 joules. For both tests, vaporization is concluded to be the rate-controlling step, followed by a fast reaction in the gas phase. (Author)

AD-291 579 Div. 10, 4
(TISTM/ODN) OTS price $1.60

MSA Research Corp., Callery, Pa.
EXTINGUISHMENT OF ALKALI METAL FIRES.
Quarterly progress rept. no. 2, 15 June-15 Sep 62,
by S. J. Rodgers and W. A. Everson. 16 Oct 62, 13p. incl. illus. tables (Rept. no. MSAR 62-124)
(Contract AF 33(657)8310)
Unclassified report

DESCRIPTORS: *Alkali metals, *Fire extinguishers, Gases, Flames, Combustion, Salts, Inorganic substances, Pressure, Foams, Control, Rubidium, Cesium, Sodium, Controlled atmospheres, Potassium, Lithium, Test equipment, Test methods, Ignition, Jet streams (Meteorology), Tests, Oxygen.

Contents:
Effect of inert gas blanketing and low O2 partial pressures on alkali metal fires
Extinguishment of small scale fires
Extinguishment of alkali metal fires using inorganic salt foams
Alkali metal jet stream ignition at various pressure conditions

AD-291 580 Div. 10, 4
(TISTM/ODN) OTS price $6.60

MSA Research Corp., Callery, Pa.
EXTINGUISHMENT OF ALKALI METAL FIRES.
Quarterly progress rept. no. 1, 15 Mar-15 June 62,
by S. J. Rodgers and W. A. Everson. 18 June 62, 58p. incl. illus. tables, 27 refs. (Rept. no. MSAR 62-65)
(Contract AF 33(657)8310)
Unclassified report

DESCRIPTORS: *Alkali metals, *Fire extinguishers, Combustion, Flames, Oxygen, Pressure, Sodium, Cesium, Rubidium, Lithium, Potassium, Carbon dioxide, Jet streams (Meteorology), Inorganic substances, Salts, Ignition, Foams, Bibliography, Control, Gases, Test methods, Physical properties, Test equipment.

Contents:
Review of current practices
Progress on review of physical and chemical properties of alkali metals
Effect of inert gas blanketing and low O2 partial pressures on alkali metal fires
Extinguishment of alkali metal fires using inorganic salt mixtures
Extinguishment of alkali metal fires using inorganic salt foams
Alkali metal jet stream ignition at various pressure conditions
Bibliography

AD-291 712 Div. 10, 9
(TISTA/SEB) OTS price $10.10

Polytechnic Inst. of Brooklyn, N. Y.
THEORETICAL AND EXPERIMENTAL INVESTIGATION OF SUPERSONIC COMBUSTION.
Interim rept. on Aerothermodynamic Investigations,
by Antonio Ferri, Paul A. Libby, and Victor Zakkay. Sep 62, 118p. incl. illus. tables, refs.
(Contract AF 33(616)7661, Proj. 7064)
(ARL 62-467) Unclassified report

DESCRIPTORS: *Combustion, Hydrogen, Air, Jet mixing flow, Chemical reactions, Reaction kinetics, Theory, Gas flow, Diffusion, Exhaust flames, Turbulence, Boundary layer, Tests, Axially symmetric flow, Aerodynamics, Supersonics.

A theoretical and experimental investigation of mixing and supersonic combustion is presented. A review of the problem under investigation is given. Then an analysis of inviscid flow fields with a finite rate chemistry for a hydrogen-air reaction is presented, and an analysis of a turbulent mixing for flows with large density gradients with no chemical reaction is presented. The analysis is compared with the experimental results. Results of the experiments in supersonic combustion are presented. (Author)

AD-291 792 Div. 10
(TISTA/SEB) OTS price $1.60

Naval Ordnance Test Station, China Lake, Calif.
EFFECTS OF THERMAL AGING ON A CAST-COMPOSITE PROPELLANT,
by Edward Kuletz and Jack M. Pakulak, Jr.
Oct 62, 18p. incl. illus. tables, 3 refs. (NOTS TP 2985)
(NAVWEPS rept. no. 7948)
Unclassified report

DESCRIPTORS: *Solid rocket propellants, *Propellant grains, Temperature, Surface properties, Binders, Rocket oxidizers, Deterioration, Storage, Energy, Kinetic theory, Tests, Safety, Ignition, Propellant properties, Sensitivity, Aging.

The activation energy, E, frequency factor, A, and specific rate constant, k, were determined for the exposed surface, subsurface, and internal regions of five cast-composite propellant (ANP-2639 AF) motors thermally aged at various temperatures from 95--165 F for different periods. The E values of the exposed surfaces for the 95 and 130 F aged samples are essentially identical (23 kcal/mole), while there is a 4 kcal/mole increase for the samples aged at 150 and 165 F. For the subsurface regions, 0.005--0.010 inch below the exposed surface, and for the internal region, 0.5 inch below the exposed surface, the E values show good similarity--each is approximately 25 kcal/mole. The study shows also that E, as well as A, vary with the aging history of the sample. A comparison of all E values and a study of the relationships of temperature to a rate factor indicate that for the thermally aged propellant grains, the primary component altered at the surface is the binder, whereas, in the interior, it is the oxidizer. (Author)

11. GROUND TRANSPORTATION EQUIPMENT

No Entries

12. GUIDED MISSILES

AD-291 241 Div. 12
9tista/gec0 OTS price $1.60

Naval Ordnance Test Station, China Lake, Calif.
THE EFFECTS OF A PERIODIC TORQUE ON THE ATTITUDE OF A SYMMETRIC ROTATING BODY,
by M. E. O'Neill. Nov 62, 12p. incl. illus.
(NOTS TP 3067)
(NAVWEPS rept. no. 8063)
Unclassified report

DESCRIPTORS: *Satellite attitude, *Satellite vehicles, Mathematical analysis, Differential equations, Integral equations, Rotating structures, Torque, Rotation.

An investigation was made of the effects of a periodic torque on the attitude of a symmetric, rotating body. The mathematical method presented here might be used to describe how torques having various wave forms would change the orientation of a space vehicle. (Author)

AD-291 429 Div. 12
(TISTA/SEB) OTS price $2.60

Space Technology Labs., Inc., Redondo Beach, Calif.
THE WORLD'S FIRST TANDEM FLIGHT IN SPACE (BASIC RESULTS) (Pervyi v Mire Gruppovoi Polet v Kosmicheskoe Prostranstvo (Osnovnye Itogi), tr. by Z. Jakubski. Nov 62, 24p. incl. illus.
(Rept. 9990-6333-KU-000; Trans. no. 70 from Pravda no. 295 (16151) pp. 1-3, 22 Oct 1962)
Unclassified report

DESCRIPTORS: *Space flight, *Space capsules, Spaceships, Satellite vehicles, Design, Translations, Guidance, Control systems, Pilots, Landing, Spaceship cabins, Radiation hazards, Selection, Physiology, Space medicine, Orbital flight paths, Communication systems, Shielding, USSR.

Results are presented for the Vostok 3 and Vostok 4 flights as reported in Pravda. Discussions are presented on the program objectives, characteristics of the ships' design, guidance and measurement, radio and TV communication, protection from radiation, biomedical problems (training of astronauts, microclimate in the capsule, eating in the capsule, methods of biomedical investigation, and results of physiological investigation), and execution of the tandem flight.

AD-291 439 Div. 12, 3, 22
(TISTW/PCR) OTS price $5.60

Naval Ammunition Depot, Crane, Ind.
MK 47 MOD 0 FLASH SIGNAL KIT FEASIBILITY STUDY OF ELIMINATING THE MK 17 MOD 0 EXTENDER,
by John E. Wildridge. 5 Nov 62, 48p. incl. illus. tables.
(NAVWEPS rept. no. 8251)
Unclassified report

DESCRIPTORS: *Signals, Safety devices, Arming devices, Detonators, Production, Costs, Fuzes, Photographs, Drafting, Feasibility studies, Guided missiles (Surface to air).

The purpose of this project was to determine the feasibility of eliminating the Mk 17 Mod 0 Extender of the Mk 47 Mod 0 Flash Signal Kit when used in the improved Tartar. The requirements to be studied were: (1) the feasibility of utilizing the output of the Safe and Arming (S&A) Device to ignite the flash signals, (2) if (1) fails, determine the feasibility of lengthening the present detonator holder of the Mk 34 Flash Signal to allow initiation by the output of the S&A Device, (3) if (1) and (2) fail, development of a new extender with 360 degree firing capabilities will be required. Seven designs were fabricated to prove out the various requirements of the task assignment. Design 4 was the most reliable design in that 23 out of 24 tests were successful. The estimated manufacturing costs per unit based on a production of 500 units for each design ranged from $4.20 for design 1 to $8.10 for design 7. Design 4 is recommended to be the most feasible approach to solve the requirements for the improved Tartar based on test performance alone. Also, maximum gap distances and reliability of the mild detonating fuse should be established by the extender developer; however, it is felt that the reliability of the Mk 9 Lead initiating the MDF is established. (Author)

AD-291 595 Div. 12, 7
(TISTA/SEB) OTS price $8.10

Sperry Gyroscope Co., Great Neck, N. Y.
STUDY OF AUXILIARY POWER SYSTEMS FOR RE-ENTRY VEHICLES,
by A. Kraus. Oct 62, 1v. incl. illus. tables.
(Rept. no. CA-4291-0059)
(Contract AF 04(694)28)
(BSD TDR 62-309) Unclassified report

DESCRIPTORS: *Auxiliary power supplies, *Guided missile noses, Gas generating systems, Turbines, Liquid rocket propellants, Solid rocket propellants, Reliability, Costs, Volume, Operation, Effectiveness, Guided missile batteries, Dry cells, Storage batteries, Re-entry vehicles, Power supplies.

Based on the criteria factors of reliability, weight, volume, ability to meet environment, availability, development and production cost, and growth potential, several types of auxiliary power units were studied for ballistic missile mounted countermeasures systems. These systems include: battery powered APU; turbine driven, solid propellant powered APU; and turbine driven, liquid propellant powered APU. The results, which consider a power-time envelope of 100 to 2000 watts and 2 to 20 minutes duration of operation, show that there is no definite point where it can be stated that one type of system is better than any other. Battery powered systems are competitive with the others for requirements of 500 watts or less and 5 minutes or less duration. Present state-of-the-art does not permit use of a solid propellant powered turbine driven APU beyond a time duration of eight minutes. For power levels above 500 watts and eight minutes operation, present state-of-the-art dictates use of a liquid propelled turbine driven APU. (Author)

AD-291 603 Div. 12
(TISTW/DLW) OTS price $1.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
ESTIMATING MISSILE RELIABILITY,
by S. Blumenthal and J. Denton. 26 Oct 62, 17p. incl. illus. 4 refs. (Technical rept. no. 81)
(Contract Nonr-22552, Proj. NR-342-022)
Unclassified report

DESCRIPTORS: *Reliability, Strategic materials, Probability, Interception probability, Numerical methods and procedures, Survival, Surface targets, Vulnerability, Guided missiles.

The probability that a missile will destroy its assigned target is studied based on estimations of missile reliability. It is desirable that each target upon which missiles are expended should have enough missiles allocated to it so that its survival probability is very small. However, we wish to avoid assigning more missiles than necessary to a given target. Nevertheless, a given amount of over-assignment is to be preferred to the same amount of under-assignment, i.e., in terms of a non-negative loss function, the loss is zero when the target does not survive and positive otherwise. (Author)

AD-291 610 Div. 12, 19
(TISTW/DLW) OTS price $6.60

Raytheon Co., Bedford, Mass.
INVESTIGATION OF ACTIVE DOPPLER VELOCITY SENSOR.
Quarterly engineering rept. no. 2, 1 Sep-30 Nov 62.
Dec 62, 1v. incl. illus. 5 refs. (Rept. no. BR-2144)
(Contract AF 33(657)9241)
Unclassified report

DESCRIPTORS: *Doppler navigation, *Radar navigation, *Doppler radar, Position finding, Velocity, Landing, Radiofrequency generators, Frequency modulation, Design, Control systems, Hypervelocity vehicles, Satellite vehicles.

Investigations were continued toward the advancement of the state-of-the-art of doppler navigation radar techniques to meet the high speed, high altitude requirements of an aerospace vehicle. Effort continued to be concentrated on the development, fabrication, and laboratory testing of a linear FM generator with good short-term stability. Development of automatic slope control techniques continued with special emphasis being placed on determination of compressed spectral shapes as a function of modulation slope and the development of a flyable automatic slope control loop for forthcoming flight tests. (Author)

AD-291 723 Div. 12
(TISTW/PCR) OTS price $6.60

Sperry Gyroscope Co., Great Neck, N. Y.
THERMAL ANALYSIS OF THREE RE-ENTRY VEHICLES,
by S. Fenster, S. Olicker, and V. Pulito.
Oct 62, 67p. incl. illus. tables, 21 refs.
(Rept. no. CA-4291-0061)
(Contract AF 04(694)28)
(BSD TDR 62-311) Unclassified report

DESCRIPTORS: *Re-entry vehicles, Ablation, Configuration, Geometry, Velocity, Guided missile trajectories, Mathematical analysis, Thermodynamics.

Thermal analyses performed on ablation cooled ballistic re-entry vehicles of three different configurations are described. Stagnation point heat flux is determined, as a function of time, by means of a relationship which is the average of four expressions based upon velocity gradients corresponding to Newtonian flow. Heat flux distribution, on the remainder of the spherical-conical portion, is calculated from the stagnation point heat flux, based upon vehicle geometry, velocity, and trajectory considerations. The transient thermal response of the ablative coating is determined from the heat flux-time profile, at a point, by numerical solution of the one-dimensional time dependent conduction equation. An adaptation of Dusinberres relaxation procedure is employed, in which the increments of the ablation coating are assumed to shrink in successive time increments, by amounts corresponding to the depths of material ablated. (Author)

AD-291 768 Div. 12
(TISTA/SEB) OTS price $5.60

Flight Sciences Lab., Inc., Buffalo, N. Y.
LINE-OF-SIGHT TRACKING OF BALLOON TYPE SATELLITES IN PERTURBED CIRCULAR ORBITS.
Final rept.,
by S. Samet. Aug 62, 51p. incl. illus. 22 refs.
(Contract AF 30(602)2396, Proj. 4519)
(RADC TDR 62-303) Unclassified report

DESCRIPTORS: *Satellite vehicles, *Balloons, Perturbation theory, Drag, Solar energy, Pressure, Mathematical analysis, Space charges, Ionization, Algebra, Tracking, Equations, Integral equations, Theory, Optical tracking, Motion, Orbital flight paths.

Analytical solutions for the short time motion of a balloon type satellite displaced from a circular orbit by the perturbing forces of Earth oblateness, air drag, and solar radiation pressure were obtained. The basic approach followed is that due to Geyling, and involves reference of the perturbed motion to a coordinate system moving with the nominal position of the satellite in unperturbed circular motion. In this coordinate system, the equations of the perturbed motion are linear, with constant coefficients. The form of the solution allows the effects of the widely varying estimates of satellite drag - neutral air, Coulomb (charged body), induction, and plasma wave - to be readily evaluated. The equations for the general case of the displacements from an elliptical orbit are shown to be reducible to a simple form which permits a series solution in powers of eccentricity. Algebraic equations for line-of-sight tracking of a satellite from any geodetic station were developed from the solutions of the perturbed motion. For ready evaluation of particular problems, the solutions were programmed for a Burroughs 205 computer. A brief discussion of the program is included in this report. (Author)

AD-291 770 Div. 12, 9
(TISTA/GEC) OTS price $2.75

Flight Control Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
A GENERAL THEORY AND ANALYSIS OF THE DYNAMIC STABILITY OF FLEXIBLE-BODIED MISSILES.
Final rept., Dec 60-May 61 on Stability and Control Investigations,
by Robert L. Swaim. Oct 62, 126p. incl. illus. tables, 10 refs.
(Proj. 8219)
(ASD TDR 62-627) Unclassified report

DESCRIPTORS: *Booster rockets, *Guided missiles, Equations, Motion, Automatic pilots, Deformation, Deflection, Stability, Differential equations, Mathematical analysis, Aerodynamics, Moments, Thrust, Liquid rocket propellants, Control systems, Guided missile trajectories, Integral transforms, Theory, Elasticity.

A detailed and general derivation of the linear equations of motion for flexible-bodied missiles is presented. In addition to the six rigid body equations, modal equations are derived for an arbitrary number of elastic degrees of freedom about all three coordinate axes. By incorporating typical automatic control system servo ele-

ment equations, a closed-loop missile-autopilot system is formed. The dynamic response of this system is represented by a series of simultaneous, linear, variable-coefficient, ordinary differential equations. The dynamic stability of the system can be determined by making any desired number of point stability analyses along the missile trajectory. By making point analyses, the variable coefficients become constant coefficients for each time instant or point along the trajectory, and the differential equations are then amenable to Laplace transform techniques. The coefficients of the resulting stability determinant are tabulated in general form. (Author)

AD-291 777 Div. 12
(TISTW/PCR) OTS price $2.60

Illinois U., Urbana.
ANALYSIS OF MISSILE LAUNCHERS.
Final report on Launcher Dynamics Study,
by M. Stippes. Sep 62, 19p. (T.&A.M. rept. no. 230)
(Contract DA 11-070-508-ORD-593, Proj. 517-01-002)
Unclassified report

DESCRIPTORS: *Guided missile launchers, Model tests, Dynamics, Mathematical analysis, Vibration, Abstracting.

This report contains a statement of the requirements of the original contract on launcher dynamics along with the abstracts of the twenty-eight technical reports issued and a list showing in which areas of the contract requirements the individual reports lie. (Author)

AD-291 809 Div. 12
(TISTE/CRJ) OTS price $9.60

Army Chemical Corps, Army Chemical Center, Md.
MODIFIED TYPE B-2 FUMING NITRIC ACID SERVICING SEMI-TRAILER.
Final rept.
Nov 62, 120p. incl. illus.
(Contract AF 33(616)60-20, Proj. 8119)
(SSD TDR 62-174) Unclassified report

DESCRIPTORS: *Trailers, *Ground support equipment, Nitric acid, Liquid rocket propellants, Fuel trucks, Instruction manuals, Specifications, Handbooks, Maintenance, Operation, Guided missiles.

The results are presented of modifying a standard MCREXE 3-212 servicing trailer. The objective was to provide a self-contained servicing trailer capable of producing high and low flow rates for fuming nitric acid. The resultant trailer provided a means of servicing missiles with a highly corrosive, storable propellant and may have established design criteria for similar trailers. (Author)

AD-291 810 Div. 12
(TISTE/CRJ) OTS price $8.60

Army Chemical Corps, Army Chemical Center, Md.
MODIFIED TYPE A-1B UDMH AND HYDRAZINE. VOLUME I OPERATION AND SERVICE INSTRUCTIONS.
Final rept.
Nov 62, 94p. incl. illus.
(Contract AF 33(616)60-20, Proj. 8119)
(SSD TDR 62-176, vol. 1) Unclassified report

DESCRIPTORS: *Trailers, *Ground support equipment, Hydrazines, Transportation, Liquid rocket propellants, Fuel trucks, Maintenance equipment, Specifications, Handbooks, Instruction manuals, Guided missiles.

This handbook contains the general operation and maintenance instructions for a modified trailer capable of transporting UDMH and hydrazine fuels for servicing missiles. (Author)

AD-291 811 Div. 12
(TISTE/CRJ) OTS price $4.60

Army Chemical Corps, Army Chemical Center, Md.
MODIFIED TYPE A-1B UDMH AND HYDRAZINE SERVICING TRAILER. VOLUME II PARTS BREAKDOWN.
Final rept.
Nov 62, 40p. incl. illus.
(Contract AF 33(616)60-20, Proj. 8119)
(SSD TDR 62-176, vol. 2) Unclassified report

DESCRIPTORS: *Trailers, *Ground support equipment, Hydrazines, Transportation, Liquid rocket propellants, Fuel trucks, Maintenance equipment, Specifications, Handbooks, Instruction manuals, Guided missiles.

This handbook contains a detailed parts listing of all the components of a trailer modified to transport specific missile propellants. Particular information is supplied pertaining to assemblies required, supply sources, and specific instructions pertaining to special manufactured or difficult to acquire parts. (Author)

AD-291 812 Div. 12
(TISTE/CRJ) OTS price $7.60

Army Chemical Corps, Army Chemical Center, Md.
MODIFIED TYPE A-1B UDMH AND HYDRAZINE SERVICING TRAILER. VOLUME III OVERHAUL INSTRUCTIONS.
Final rept.
Nov 62, 79p. incl. illus. tables.
(Contract AF 33(616)60-20, Proj. 8119)
(SSD TDR 62-176, vol. 3)
Unclassified report

DESCRIPTORS: *Trailers, *Ground support equipment, Hydrazines, Transportation, Liquid rocket propellants, Fuel trucks, Maintenance equipment, Specifications, Handbooks, Instruction manuals, Guided missiles.

This handbook contains detailed information, including part numbers, nomenclature, material and operating specifications plus the proper sequencing for replacing parts, for a modified trailer capable of transporting UDMH and hydrazine fuels for servicing missiles. (Author)

13. INSTALLATIONS AND CONSTRUCTION

AD-291 571 Div. 13
(TISTW/PCR) OTS price $12.00

MRD Div., General American Transportation Corp., Niles, Ill.
CLOSURES FOR HARDENED PROTECTIVE HANGARS,
by Fred C. Finlayson.
Aug 62, 157p. incl. illus. 23 refs.
(Contract AF 29(601)2550, Proj. 1080)
(AFSWC TDR 62-77) Unclassified report

DESCRIPTORS: *Hangars, Aerodynamic configurations, Spoilers, Air blast, Nuclear explosions, Pressure, Shock tubes, Effectiveness, Schlieren photography, Vulnerability, Hardening.

The use of aerodynamic spoilers and deep debris pits in front of hardened aircraft shelter en-

trances to reduce air blast loads on the entrance structure is examined. The problems of analytically predicting air blast loads under these conditions are discussed. Probability of survival for shelters designed to withstand overpressures reached near the vicinity of the crater's edge for nuclear weapons is given. Based on limits prescribed by maximum probability of survival considerations, the possibility of reproducing nuclear blast conditions in the shock tube is discussed. An extensive shock tube test program, which evaluated the effectiveness of a number of shapes and sizes of spoilers over a wide range of shock strengths, is described. The results of these tests are presented in a manner which provides blast load data for the dynamic design of entrance structures. Emphasis is given to the alleviation of blast loads on the vertical closure for an earth-covered arch or cylinder shelter. This type of entrance had been shown to be the most practical for aircraft shelter in an earlier phase of the project. (Author)

AD-291 698 Div. 13, 31
(TISTM/EJH) OTS price $7.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
POINT BARROW TRIALS - FY 1960; FREE FLOODED AND ICE-AGGREGATE-FILL.
Final rept.,
by J. E. Dykins, N. S. Stehl, and K. O. Gray.
23 Nov 62, 74p. incl. illus. tables (Technical rept. no. R-218)
(Proj. Y-F015-11-012)
Unclassified report

DESCRIPTORS: *Ice, Structures, Sheets, Thickness, Sea water, Density, Temperature, Tensile properties, Deterioration, Climatic factors, Arctic regions.

During the winter of 1959-60, trials were conducted at Point Barrow, Alaska to further develop techniques for increasing the bearing strength of ice sheets by increasing their thickness and to observe the behavior of the ice types during the rising temperatures of an arctic spring. For comparison, one confined flooded test plot was constructed concurrently with the free flooded plot and one was constructed concurrently with the ice-aggregate plots. Temperature, salinity, density and strength of the various types of constructed sea ice and the natural sea ice were compared. Free flooding was the simplest construction technique. Both types of aggregate used in the dry-fill method (fractured young sea ice and chipped natural sea ice) proved difficult to handle and much of the equipment was too large for the small plots. Placement of the aggregate fill influenced the temperature of the underlying natural ice less than did the flood construction. Approximately one week after completion of construction the average ice temperatures of all plots were within a few degrees of each other. Of the 7 ice-aggregate-fill plots, 4 had lower strength values than the flooded ice, and 3 had higher values. During the thaw period, the aggregate-fill ice deteriorated faster than the free flooded or the confined flooded ice. (Author)

14. MATERIALS (NON-METALLIC)

AD-291 401 Div. 14, 27
(TISTM/BRW) OTS price $2.00

Little, Arthur D., Inc., Cambridge, Mass.
DEVELOPMENT OF PYROLYTIC REFRACTORY MATERIALS FOR SOLID-FUEL ROCKET MOTOR APPLICATIONS.
Annual technical summary rept. (Final)
30 June 61-30 June 62,
by Ronald Francis. 10 July 62, 76p. incl. illus. tables, 20 refs.
(Contract DA 19-020-ORD-5490, Proj. 5B93-32-004)
(WAL TR 766.41/2-3) Unclassified report

DESCRIPTORS: *Graphite, *Refractory materials, *Rocket motor nozzles, Refractory coatings, Alloys, Synthesis, Vapor plating, Pyrolysis, Methanes, Benzenes, Boron alloys, Silicon alloys, Zirconium alloys, Nitrides, Boron compounds, Microstructure, Thermal insulation, Preparation, Materials.

Studies were made to investigate the preparation and evaluation of pyrolytic graphite alloys for solid-fuel rocket motor structural applications as gained by simultaneous high temperature vapor deposition of suitable refractory metal and carbon sources in reducing atmospheres. The development of a number of experimental approaches and furnace designs for material preparation is described, with both induction and resistance heating techniques being employed. Deposition of pyrolytic graphite as a model system is characterized, and variation of its crystal structure, approach of lattice values parameters to single crystal values with increased deposition temperature and heat treatment is observed. An experimental approach undertaken to develop refractory metal alloys of numerous systems in concentrations to 1% is described. Lattice spacings, crystallite sizes, density, and microstructure almost indistinguishable from unalloyed pyrolytic graphite prepared under equivalent conditions and evidence of carbide formation are found. Development of analytical techniques and low temperature (1550 F) oxidation in laboratory atmospheres are also discussed. (Author)

AD-291 413 Div. 14, 25
(TISTM/BRW) OTS price $3.60

New York State Coll. of Ceramics, Alfred U.
ELASTIC PROPERTIES OF SINGLE CRYSTAL MAGNESIA,
by W. B. Crandall, Richard Petticrew, and D. H. Chung. 1 Nov 62, 21p. incl. illus. tables, 29 refs. (Rept. no. 4)
(Grant DA-ORD-31-124-60-G58)
(AROD rept. no. 2891:4) Unclassified report

DESCRIPTORS: *Single crystals, *Magnesium compounds, *Oxides, Elasticity, Measurement, Physical properties, Shear stresses, Tensile properties, Deformation, High temperature research, Low temperature research, Mechanical properties.

The elastic moduli in shear and in tension of single crystal MgO were measured on three orientations using a Forester-Type apparatus. Using elastic constants and coefficients which were calculated from these data, values for sound velocity, Debye temperature, compressibility and Voigt-Reuss-Hill intercepts were also calculated. Good agreement was found between the measured polycrystalline elastic moduli determined in the first report and the Voigt-Reuss-Hill values calculated from these single crystal data. (Author)

AD-291 459 Div. 14, 25
(TISTM/BRW) OTS price $3.60

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
ELECTRIC AND MAGNETIC PROPERTIES OF V2O3 AND RELATED SESQUIOXIDES,

by Archie J. Mac Millan. Oct 62, 32p. incl. illus. tables, 24 refs. (Technical rept. no. 172). (Contracts AF 19(604)5482 and Nonr-184110, Proj. NR 018-801)

Unclassified report

DESCRIPTORS: *Vanadium compounds, Semiconductors, Electrical properties, Magnetic properties, Phase transitions, Transition temperature, Oxides.

In the room-temperature (corundum) phase, V203 is highly conducting and appears intrinsically to be a degenerate p-type semiconductor. The electrical behavior is relatively insensitive to deviations from the correct metal-to-oxygen ratio. Solid solutions of V203 with the sesquioxides of Al, Sc, Cr, and Ti have also been studied. The sesquioxides of Al, Sc, Cr, which in themselves are highly resistive semiconductors, when added to V203 in small concentrations (2 to 4 mole %) increase the resistivity of the room-temperature phase by about 2 decades, change the character of the conduction process from metallic to semiconducting, and increase the temperature of the transition between the two phases. The resistivity of the low-temperature phase is only slightly affected. Upon further substitution the transition temperature is depressed and the electrical properties begin to approach those of the added sesquioxides. The effect on the transition temperature is in contrast with that found for Mg and Zr substitutions, which always depress the temperature of transition. Solid solutions with Ti, which forms a highly conducting sesquioxide, are highly conducting and p-type in both phases after about 5 mole % Ti substitution. (Author)

AD-291 485 Div. 14
(TISTM/BRW) OTS price $.50

Forest Products Lab., Madison, Wis.
EFFECT OF ELEVATED TEMPERATURES ON STRENGTH PROPERTIES OF REINFORCED PLASTIC LAMINATES.
Final report on Materials Application,
by Kenneth H. Boller. Oct 62, 14p. incl. illus. table, 7 refs.
(Contract AF 33(616)61-06, Proj. 7381)
(ASD TDR 62-629) Unclassified report

DESCRIPTORS: *Plastics, *Laminates, Reinforcing materials, High temperature research, Tensile properties, Shear stresses, Glass textiles, Asbestos fiber, Silicone resins, Phenolic resins, Epoxy resins, Mechanical properties.

Several reinforced plastic laminates were investigated to determine their strength within their useful range of temperature and duration of exposure. Results of tension, compression, and interlaminar shear evaluations are summarized for six laminates after exposure to temperatures ranging from room temperature to 1,000 F. and soak periods ranging from about 2 minutes to 1,000 hours. The results show that the strength usually decreases immediately with application of heat. Further application of heat at constant temperature, however, sometimes results in an increase in strength, but continued exposure at the higher temperatures ultimately results in a complete loss of strength. Exceptions and various degrees of degradation depend on the kind of material, the temperature, and the period of exposure. Hence, curves are presented for six materials, three mechanical tests, and a range of duration of exposure, so that each may be judged separately. (Author)

AD-291 504 Div. 14
(TISTP/JW) OTS price $1.60

Army Electronics Research and Development Lab., Fort Monmouth, N. J.
SORPTION OF WATER IN POLYMERIC MATERIALS,
by Robert G. Lauttman and Marvin N. Stein,
Nov 62, 20p. incl. illus. 7 refs. (AELRDL Technical rept. no. 2315)

Unclassified report

DESCRIPTORS: *Polymers, *Absorption, Water, Nylon, Temperature, Bonding, Vacuum systems, Dielectric properties.

The dielectric properties of long chain polymers are markedly affected by hydrogen bonding solutes absorbed within the structure. The moisture content of Nylon 66, Nylon 610, and Mylar was measured as a function of vacuum desiccation at room temperature, vacuum heating and non-vacuum heating over a wide range of temperatures, rate of absorption measurements, quenching processes, and residue analysis. These studies have indicated that two different processes are involved in the sorption of water by these polymers, namely, the normal type absorption characterized by weakly bonded water and the molecular absorption characterized by strongly bonded water. A thermal threshold was observed beyond which the latter type of absorption decreases rapidly. The rate of absorption as a function of the amorphous fraction was determined by the measurement of quenched and unquenched samples. The results were interpreted as necessary consequences of the nature of the structure and interchain bonding of these polymers. (Author)

AD-291 539 Div. 14, 26
(TISTE/CAM) OTS price $1.60

Narmco Industries, Inc., San Diego, Calif.
POTENTIAL OF FILAMENT WOUND COMPOSITES.
Monthly progress rept. no. 19, 1-30 Nov 62,
by D. Stevens and W. H. Otto. Nov 62, 12p. incl. illus. tables,
(Contract NOw 61-0623-c)

Unclassified report

DESCRIPTORS: *Filament wound construction, *Glass textiles, *Synthetic fibers, *Reinforcing materials, *Manufacturing methods, Resins, Glass, Fibers, Coatings, Nylon, Load distribution, Stresses, Fatigue (Mechanics), Tensile properties, Laminates, Microphotography, Photoelasticity, Test methods, Experimental data.

The structural advantages of coating the fibers in a fiberglass composite with a ductile resin were investigated. It was hypothesized that such a coating might minimize the effects of crazing of the relatively brittle resin matrix by stopping craze cracks before they reach the glass fibers. In addition, the ductile coating might reduce any stress concentrations around broken fibers where load must be transferred into the broken fiber by resin shear. In an effort to detect the latter effect, fiber pull-out specimens were prepared using nylon coated fibers. Data on these tests are tabulated. Photoelastic specimens were prepared using Nylon coated fibers and containing discontinuities in the fibers. Biaxial tests were conducted on Scotchply maltese crosses simulating a filament-wound fiber-glass laminate. The data presented indicates that the maltese cross in the configuration used has its limitations, but among its advantages is the fact that it provides a cheap and convenient method of testing materials under biaxial loads. (Author)

AD-291 585 Div. 14
(TISTM/RGR) OTS price $1.10

Naval Radiological Defense Lab., San Francisco, Calif.
AN IMPROVED ZINC BROMIDE SHIELDING WINDOW,
by W. B. Lane and M. J. Nuckolls. 2 Oct 62, 11p. incl. illus. (Rept. no. NRDL-TR-594)
Unclassified report

DESCRIPTORS: *Transparent panels, *Shielding, *Zinc compounds, Design, Radioactivity, Steel, Corrosion, Bromides.

An improved zinc bromide-filled shielding window for hot cell use was designed, constructed, and performance-tested. Bare steel surfaces under an argon atmosphere satisfactorily contained zinc bromide solution. No corrosion or deterioration of optical properties appear in a window which was installed in May 1961. This system is an improvement over the previously used painted surfaces in an air atmosphere. (Author)

AD-291 661 Div. 14
(TISTM/ODN) OTS price $.75

Forest Products Lab., Madison, Wis.
EFFECTS OF WEATHERING ON THE MECHANICAL PROPERTIES OF FOUR REINFORCED PLASTIC LAMINATES.
Report on Non-Metallic and Composite Materials, by Kenneth E. Kimball. Oct 62, 24p. incl. illus. tables.
(Contracts AF 33(616)58-1 and AF 33(616)61-06, Proj. 7340)
(WADC TR 55-319, suppl. 4)
Unclassified report

DESCRIPTORS: *Laminates, *Plastics, Reinforcing materials, Deformation, Elasticity, Florida, Glass textiles, Laminated glass, Asbestos fiber, Phenolic resins, Control, Panama, Mechanical properties, Tensile properties, Hardness, Rupture, Exposure.

Four different reinforced plastic laminates were exposed to various environmental conditions for periods up to 36 months. After completion of the exposure, the laminated panels were evaluated under normal, wet, and elevated temperature conditions. Data on the effect of 3, 12, and 36 months' exposure on the flexural properties of laminates and their appearance after 36 months are presented. Results show that the effect of outdoor exposure varies with the types of laminates and conditions of exposure. Weathering at the Florida site usually resulted in the greatest reduction in strength. In general, normal and wet flexural strengths of the weathered glass-fabric laminates were 80% or more of the corresponding control strengths, but the elevated temperature strength was only about 55 to 75% of the controls. A higher percentage of over-all strength retention was noted for the phenolic-asbestos mat laminate than for the glass-fabric laminates. (Author)

AD-291 663 Div. 14, 17
(TISTM/ODN) OTS price $1.00

Forest Products Lab., Madison, Wis.
RESISTANCE OF ADHESIVE-BONDED METAL LAP JOINTS TO ENVIRONMENTAL EXPOSURE.
Report on Materials Application,
by W. Z. Olson, H. W. Eickner, and R. M. Lulling. Oct 62, 32p. incl. illus. tables.
(Contract AF 33(616)61-06, Proj. 7381)
(WADC TR 59-564, pt. 2) Unclassified report

DESCRIPTORS: *Metals, *Adhesives, Deformation, Alloys, Aluminum alloys, Stainless steel, Stresses, Bonded joints, Exposure, Films, Florida, Shear stresses, Processing, Elasticity, Bonding.

An investigation was made of the relative durability of metal-bonding adhesives in exterior exposure at two sites, Miami, Fla., and the Panama Canal Zone. Twelve sets of lap-joint panels of clad 2024-T3 aluminum alloy bonded with 12 different adhesives, and one set of 17-7PH corrosion-resisting steel bonded with another adhesive, were exposed at these two sites. Panels were exposed while stressed in bending and while unstressed. Sets of panels were removed and tested periodically through 3 years of exposure. In addition, several short-term laboratory exposure conditions were used to determine whether such tests might provide information similar to the long-term exposure. In general, stressed specimens decreased in strength more than the unstressed specimens, Florida exposure caused a greater loss in strength than the Panama exposure, and exposure to the weather was more severe than laboratory exposure cycles. (Author)

AD-291 669 Div. 14
(TISTM/ODN) OTS price $1.60

General Electric Co., Evendale, Ohio.
HIGH STRENGTH GLASS FIBERS DEVELOPMENT PROGRAM.
Bimonthly progress rept. no. 3,
by D. L. Hollinger and H. T. Plant. 20 Nov 62, 17p. 16 refs.
(Contract NOw 61-0641-c)
Unclassified report

DESCRIPTORS: *Glass textiles, *Filament-wound construction, *Fibers, Literature, Mechanical properties, Tensile properties, Failure (Mechanics), Surface properties, Processing, Rings, Reinforcing materials.

Contents:
Status of information relative to commercial fiberglass
Intrinsic strength of the glass fiber
Degree of surface damage existing in the fibers after processing into the filament wound structure
Failure mechanisms in a filament wound structure
Need for understanding in two distinct problem areas

AD-291 802 Div. 14, 4
(TISTM/ODN) OTS price $.75

Rock Island Arsenal Lab., Ill.
HIGH STRENGTH CELLULOSIC MATERIALS THROUGH INTERNAL POLYMERIZATION,
by L. W. Lynch. 2 Oct 62, 25p. incl. illus. tables, 23 refs. (Rept. no. 62-3289; 2)
(Proj. 593-32-007)
Unclassified report

DESCRIPTORS: *Paper, *Acrylonitriles, *Polymerization, Fungusproofing, Preparation, Cellulose, Acrylic resins, Methyl radicals, Tensile properties, Polymers, Catalysis, Sulfates, Filter papers, Physical properties, Materials, Test methods.

The internal polymerization of two monomers, acrylonitrile and methyl methacrylate, in three different types of paper was accomplished using the free radical-catalysis mechanism. Modified paper products containing 5 to 35% of polymer were prepared. The tensile properties (both

wet and dry) and the stiffness increased on each type of paper with increases in polymer content. The polymerization of methyl methacrylate in each of the three types of paper resulted in large increases in the wet and dry tensile strength of the paper. Increases in the wet and dry tensile strength of filter paper were realized with the acrylonitrile treatment. Only minor improvements were realized with the acrylonitrile treatment of kraft paper and target paper. The stiffness of the kraft and target papers increased by approximately 1.6% for every 1% increase in polymer content and the filter paper stiffness increased at approximately twice this rate. Some fungus resistance was imparted to the paper by the internal polymerization of methyl methacrylate. (Author)

AD-291 814 Div. 14, 8
(TISTM/ODN) OTS price $1.60

Synthetic Mica Co., West Caldwell, N. J.
ULTRA HIGH TEMPERATURE DIELECTRIC EMBEDDING MATERIALS.
Final rept., 28 July-27 Oct 62,
by S. Rodney. 27 Oct 62, 16p. incl. tables.
(Contract NObs-86219, Proj. 007-04-01)
Unclassified report

DESCRIPTORS: *Dielectrics, *Embedding substances, *Encapsulation, *Ceramic coatings, Glass seals, Glass, Manufacturing methods, Electronic equipment, High temperature research, Thickness, Absorption, Water, Dielectric properties, Resistance, Resistors, Tests, Electrical properties.

A devitrifiable glass was developed which is completely compatible as a coating for the OX1A potting compound. Quasi-components (discs) coated by using the fluidized bed process were evaluated for water absorption and high temperature electrical properties. A prototype resistor was developed which remained functional after exposure to temperatures slightly in excess of 600 C. (Author)

AD-291 818 Div. 14, 4
(TISTM/REB) OTS price $1.60

Naugatuck Chemical Div., United States Rubber Co., Conn.
SYNTHESIS OF REGULATED STRUCTURE POLYPHENYL-ETHER-SILOXANE ELASTOMERS.
Quarterly progress rept. no. 5, 1 July-30 Sep 62,
by Robert MacFarlane, Jr. 30 Sep 62, 15p. incl. tables.
(Contract DA 19-020-ORD-5507)
Unclassified report

DESCRIPTORS: *Elastomers, *Silicones, *Silicone resins, *Ethers, Phenyl radicals, Polymers, Copolymerization, Phenols, Synthesis.

The preparation of p,p'-dihydroxydiphenyl ether is greatly improved by the use of secondary or tertiary alcohols rather than methanol as cosolvent in the high temperature alkaline hydrolysis of p,p'-dibromodiphenyl ether. The amount of alkoxy derivatives is drastically reduced and separation of these from the desired product is simplified. This reaction, using isopropanol, has been successfully scaled up to a 20 gallon reactor. Further investigation of reactions of diphenyl ether derivatives in molten caustic, this time using a low-melting eutectic mixture, still results in no p,p'-dihydroxydiphenyl ether. Several copolymers of phenyl ethers with siloxanes have been prepared. These are suspected to be of relatively low molecular weight. In contrast to earlier results, difficulties have been encountered in effecting cross-linking with peroxides. (Author)

AD-291 825 Div. 14
(TISTM/REB) OTS price $2.60

Watertown Arsenal Labs., Mass.
FORMATION AND PROPERTIES OF ALUMINA FIBER.
Technical rept. on Materials for Army Weapons and Combat Mobility,
by Morton I. Kliman. Nov 62, 26p. incl. illus. tables, 7 refs. (Technical rept. no. WAL TR 371/50)
(Proj. 59332007)
Unclassified report

DESCRIPTORS: *Aluminum compounds, *Ceramic fibers, Fibers, Extrusion, Sintering, Production, Mechanical properties, Elasticity, Oxides.

The production of high strength aluminum oxide fiber has been achieved by means of plastic extrusion and solid state sintering of selected alumina powders at elevated temperatures. The processing variables for producing fibers possessing transverse rupture strengths of 100,000 psi are presented. The variation of elastic modulus and transverse rupture strength with temperature for alumina fiber is reported for temperatures up to 1300 C. (Author)

AD-291 826 Div. 14
(TISTM/REB) OTS price $1.60

Watertown Arsenal Labs., Mass.
IMPACT STRENGTH OF ALUMINA FIBER-CERAMIC COMPOSITES.
Technical rept. on Materials for Army Weapons and Combat Mobility,
by Morton I. Kliman. Nov 62, 9p. incl. illus. table, 3 refs. (Technical rept. no. WAL TR 371/51)
(Proj. 59332007)
Unclassified report

DESCRIPTORS: *Composite materials, *Aluminum compounds, *Ceramic fibers, Impact shock, Mechanical properties, Fibers, Ceramic materials, Oxides.

The use of randomly dispersed aluminum oxide fiber to impart increased impact strength to a porcelain body and to a refractory aluminum phosphate-bonded alumina body is reported. The improved impact strength is either retained or increased at elevated testing temperatures. The variation of impact strength with alumina fiber content was determined for the fiber-ceramic body composites. (Author)

AD-291 827 Div. 14
(TISTM/REB) OTS price $1.60

Watertown Arsenal Labs., Mass.
FORMATION OF ALUMINA WHISKERS.
Technical rept. on Materials for Army Weapons and Combat Mobility,
by Morton I. Kliman. Nov 62, 12p. incl. illus. tables (Technical rept. no. WAL TR 371/52)
(Proj. 59332007)
Unclassified report

DESCRIPTORS: *Ceramic fibers, *Aluminum compounds, *Oxides, Fibers, Single crystals, Production, Mechanical properties, Elasticity, Growth.

The feasibility of forming alumina whiskers of strengths approaching that of atomic cohesion has been explored. Some considerations regarding the selection of aluminum oxide as a candidate structural material for whisker production are presented. Aluminum oxide whiskers possessing elastic moduli and transverse rupture strengths greater than those of bulk alumina have been formed by a vaporization-condensation process at temperatures above 1950 C. Typical values for alumina whisker elastic moduli range from 68 to 72 million psi; and transverse rupture strengths average 2,000,000 psi. (Author)

AD-291 849 Div. 14, 25
(TISTM/REB) OTS price $1.60

Institute of Engineering Research, U. of Calif., Berkeley.
INTERNAL STRESSES IN MODEL CERAMIC SYSTEMS III.
Summary technical rept.,
by Richard M. Fulrath and Joseph A. Pask.
1 Nov 62, 15p. 11 refs. (Series no. 119, Issue no. 3)
(Contract AF 49(638)4)
Unclassified report

DESCRIPTORS: *Ceramic materials, *Crystal structure, Analysis, Microstructure, X-ray diffraction analysis, Stresses.

A unique fabrication procedure of vacuum hot-pressing multicomponent systems was used to form model ceramic systems for studying internal stresses. Methods of analysis of internal stress combining the microstructural features and X-ray diffraction patterns were developed. Three different particle shapes dispersed in glassy matrices were studied. Internal stresses were found to be of secondary importance in systems with strong interfacial bonds and of primary importance in systems in which strong interfacial bonds were not developed. (Author)

AD-291 883 Div. 14
(TISTM/REB) OTS price $1.60

Watertown Arsenal Labs., Mass.
TRANSVERSE RUPTURE STRENGTH OF ALUMINA FIBER-CERAMIC COMPOSITES,
by Morton I. Kliman. Nov 62, 13p. incl. illus.
(Technical rept. no. WAL TR 371/53)
(DA Proj. 59332007)
Unclassified report

DESCRIPTORS: *Ceramic fibers, *Composite materials, *Aluminum compounds, *Oxides, Mechanical properties, Rupture, Refractory materials.

The utilization of high strength alumina fiber to reinforce a wide range of ceramic bodies is reported. The transverse rupture strength of these composite structures is markedly increased over that of the bodies without alumina fiber content. The variation of strength increase with alumina fiber content is reported for composites of alumina fiber combined with portland cement; an unfired porcelain body; glass; a porcelain body; and phosphate-bonded alumina. (Author)

AD-291 884 Div. 14, 24
(TISTM/ODN) OTS price $5.60

Xerox Corp., Rochester, N. Y.
FROSTED PHOTOPHASTIC.
Interim Engineering rept. no. 1, 1 June-30 Nov 62,
by J. Bickmore, C. Claus and others. 30 Nov 62, 52p. incl. illus. tables, 10 refs.
(Contract AF 33(657)8814)
Unclassified report

DESCRIPTORS: *Photographic recording systems, *Films, *Plastics, Heat treatment, Deformation, Thickness, Photoreceptors, Thin films, Selenium alloys, Tellurium alloys, Silicones, Oils, Electrodes, Intermetallic compounds, Electric currents, Electric potential, Voltage, Photoelectric materials, Test equipment, Tellurides.

This report involves a project directed toward improving electrostatic thermoplastic photography. The preferred approach has been to combine charge transfer through a thin film of insulating liquid with development of the electrostatic image by frost-type deformation. Effort has also been expended on formulation and evaluation of panchromatic photoreceptors based on multilayer structures. Charge transfer through a thin layer of liquid was selected for this study rather than transfer of the electrostatic image by air breakdown because experience indicated it would overcome problems of high voltage threshold, critical gap spacing and nonuniformity of transfer associated with air breakdown. Frost development of the transferred electrostatic image was preferred because it provides a thermoplastic imaging method capable of continuous tone response in the absence of any optical or physical screening of the image. Heat-softening a thin thermoplastic film bearing the electrostatic pattern gives a light-scattering deformation image of high resolution continuous-tone quality. (Author)

AD-291 888 Div. 14
(TISTM/ODN) OTS price $1.60

Southern Research Inst., Birmingham, Ala.
THE DEVELOPMENT OF HEAT-RESISTANT PAINTS FOR METALS.
Bimonthly progress rept. no. 3, 11 Sep-9 Nov 62,
by R. W. Liggett. 28 Nov 62, 17p. incl. tables.
(Contract NOw 62-0727-d)
Unclassified report

DESCRIPTORS: *Heat resistant paints, *Refractory coatings, *Metals, Aging, Zinc compounds, Oxides, Methyl radicals, Phosphites, Humidity, Silicon compounds, Dioxides, Sprays, Aluminum, Phosphates, Butyl radicals, Amines, Phosphoric acids, Hardness, Bonding, Preparation, Corrosion inhibition.

Studies were made of the effect of curing time at 72 F and 75% RH on the properties of coatings prepared from mixtures of zinc oxide, dimethyl hydrogen phosphite (DMHP), and colloidal silica. For the preparation of heat- and water-resistant coatings, it was found that the coatings had to be cured for only 2 hours at 72 F and 75% RH. The remainder of the 24-hour curing period could be under ambient conditions of temperature and humidity. Zinc-oxide-DMHP-colloidal silica coatings applied to aluminum panels, kept wet for 90 minutes by intermittent spraying with water, and then cured 24 hours under ambient conditions, were heat-resistant and water-resistant. Coatings prepared by the reaction of zinc oxide and di-n-butylamine phosphate or di-n-butylamine phosphite were similar in properties to coatings prepared by the reaction of zinc oxide and DMHP. However, the properties of coatings prepared by the reaction of zinc oxide and the methyl ester of polyphosphoric acid

were not similar to those of the zinc oxide-DMHP coatings. The results obtained from these studies have led to some information about the course of the reaction of zinc oxide and DMHP. (Author)

AD-291 897 Div. 14
(TISTM/REB) OTS price $12.50

Narmco Industries, Inc., San Diego, Calif.
HIGH TEMPERATURE RESINS, ANALYSIS OF PROCESS PARAMETERS, AND EVALUATION PROCEDURES FOR FILAMENT WOUND COMPOSITES. PART II. ANALYSIS OF PROCESS PARAMETERS.
Rept. for 13 July 59-28 Feb 61 on Organic and Inorganic Plastics,
by Warren E. Ponemon, Charles B. Kurz, and S. Yurenka. May 62, 167p. incl. illus. tables. (Contract AF 33(616)6737, Proj. 73402; In cooperation with Lamtex Industries, Inc.)
(WADD TR 60-791, pt. 2) Unclassified report

DESCRIPTORS: *Resins, *Heat resistant polymers, *Filament wound construction, *Laminates, *Composite materials, Processing, Rocket cases, Physical properties, Mechanical properties, Loading, Friction, Impregnation, Tensiometers, Production.

The principal process parameters studied were the delivery of reinforcement and resin impregnation. Variations of the standard ECG 150 -1/0 yarn were investigated. A study of the rate of loading was conducted to determine its effect on laminate ultimate strength. Evaluation of the parameters was primarily accomplished by comparison of the physical laminate properties obtained, along with the ultimate strengths developed by biaxially loaded test specimens. The effectiveness of the application of optimum process parameters to a practical structure was investigated by the fabrication and test of several typical rocket motor cases. In delivery, the tension magnitude and uniformity greatly influenced both the physical and mechanical properties of the laminate. Viscosity of the resin system was the most critical parameter affecting impregnation. The glass fiber strength of production yarn, ECG 150 -1/0, was equivalent to the same type environmentally protected yarn and environmentally protected roving. Load rate control was essential in magnitude of the failure stress and the mode of failure. (Author)

15. MATHEMATICS

AD-291 418 Div. 15
(TISTP/JW) OTS price $9.60

David Taylor Model Basin, Washington, D. C.
ELASTIC LOBAR BUCKLING OF RING-SUPPORTED CYLINDRICAL SHELLS UNDER HYDROSTATIC PRESSURE,
by Thomas E. Reynolds. Sep 62, 107p. incl. illus. tables, 44 refs. (Rept. no. 1614)
Unclassified report

DESCRIPTORS: *Cylindrical bodies, *Buckling, Elasticity, Hydrostatic pressure, Stiffened cylinders, Hemispherical shells, Deformation, Deflection, Rings.

A small-deflection analysis is developed for the elastic interbay buckling of ring-stiffened cylindrical shells in which the influence of the rings on deformations before and during budkling is considered. Tests were carried out with a machined, ring-stiffened cylinder (BR-4B) subjected to external hydrostatic pressure. Collapse was initiated by elastic asymmetric buckling of the shell. Strain measurements taken during the test demonstrated that the Southwell method of determining buckling strength nondestructively is applicable in the case of interbay buckling. The results of this and three other tests of machined cylinders are in good agreement with the theory. While the Von Mises theory is inaccurate for closely spaced rings, its continued application for estimating elastic buckling strength is probably justified since it is always conservative and can be represented in a simple form. (Author)

AD-291 446 Div. 15
(TISTP/JW) OTS price $4.60

Boeing Scientific Research Labs., Seattle, Wash.
SINGULAR PERTURBATIONS OF DIFFERENTIAL EQUATIONS, II,
by Bernard Friedman. Aug 62, 46p. incl. illus. 2 refs. (Mathematical note no. 275; Document no. D1-82-0208)
Unclassified report

Also available from the author.

DESCRIPTORS: *Integral equations, *Perturbation theory, Boundary layer, Functions, Polynomials, Linear systems, Partial differential equations, Integrals.

The method of perturbation is frequently applied in cases where the original differential equation contains a small parameter E. The solution is written as a formal power series in E, the series is substituted in the differential equation, the coefficients of corresponding powers of E are equated, and, finally, if we are fortunate, the resulting equations are solvable. The resulting expansion may converge to the solution or, if not, it may give an asymptotic expansion of the solution for small values of the parameter E. Those cases are considered for which this expansion procedure fails because the limit of the original differential equation as E goes to zero is a differential equation of lower order. This lowering of the order produces a surplus of boundary conditions and it is necessary to investigate how these boundary conditions should be used to determine the solution of the limiting equation. (Author)

AD-291 475 Div. 15
(TISTB/DGH) OTS price $1.10

California U., Los Angeles.
THE PAYOFF-RELEVANT DESCRIPTION OF STATES AND ACTS,
by Jacob Marschak. 7 Oct 62, 9p. 2 refs. (Working paper no. 18)
(Contract Nonr-23373, Proj. NR 047-041)
Unclassified report

DESCRIPTORS: *Economics, Mathematical analysis.

AD-291 604 Div. 15, 30
(TISTP/JW) OTS price $1.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
OPTIMAL DESIGN OF EXPERIMENTS,

by Herman Chernoff. 31 Oct 62, 15p. incl. illus. 5 refs. (Technical rept. no. 82)
(Contract Nonr-22552, Proj. NR-342-022)
Unclassified report

DESCRIPTORS: *Experimental data, *Statistical functions, Research program administration, Statistical tests, Linear systems, Model tests, Stresses, Vector analysis, Sequential analysis, Design.

AD-291 615 Div. 15
(TISTP/TL) OTS price $1.60

George Washington U., Washington, D. C.
A SHORT TABLE OF FRACTILES OF THE BETA DISTRIBUTION,
by Jerome Bracken. 18 Dec 62, 4p. tables.
(Serial no. T-150)
(Contracts Nonr-76103, Proj. NR 345 107, Nonr-76105, Proj. NR 047 001 and Nonr-76106, Proj. NR 347 008)
Unclassified report

DESCRIPTORS: *Statistical distributions, *Statistical functions, *Probability, Numerical analysis, Integration, Tables.

For given fractiles π = .01, .05(.05).65, .99, given are values of z_π such that $F_\beta(z_\pi|r,n) = \pi$, where n = 2(1)30, 40, 50 and r = 1(1) $\left[n/2\right]$, using a parametrization. (Author)

AD-291 778 Div. 15, 30
(TISTW/PCR) OTS price $9.60

Iowa State U., Iowa City.
ANALYSIS OF DATA TRACES OF VERY SHORT DURATION. Rept. no. 3 on Data Acquisition and Reduction, Phase 3,
by James Hurt, John Denkmann, and Royce Beckett. 1 Dec 62, 110p. incl. illus. 46 refs. (Rept. no. 6)
(Contract DA 11-070-508-ORD-1232, Proj. 517-01-002)
Unclassified report

DESCRIPTORS: *Data, Guided missile launchers, Dynamics, Gun mounts, Fourier analysis, Electric filters, Least squares method, Polynomials, Harmonic analysis, Data processing systems, Analysis, Mathematical analysis.

A study of the methods of analysis of non-reproducible data curves which are of very short duration is presented. The major effort is directed toward finding and isolating the component parts of a transducer output. An example curve is analyzed by the methods of this report and the results are presented in graphical form for illustration. (Author)

AD-291 839 Div. 15, 32
(TISTB/MS) OTS price $1.10

California U., Los Angeles.
FURTHER PROBLEMS IN INDIVIDUAL AND GROUP SURVIVAL,
by James B. MacQueen. 19 Oct 62, 9p. 6 refs.
(Working paper no. 20)
Unclassified report

DESCRIPTORS: *Games theory, *Survival, *Decision making, Mathematical analysis, Theory, Management engineering, Probability, Economics.

Six mostly unsolved problems in individual and group survival are discussed. These are of the following general descriptions: At time t an individual, belonging to a group, has resources x(t). These are used up in a specified way, but at times t(1), t(2),...opportunities arise. The individual makes a decision at each time and his resources are then changed, hopefully, increased in a random manner which depends on the decision. Thus at each opportunity the individual is thought of as playing a game, either with nature or with other members of the group. The outcome of the game for each individual is his change in resources. The individual is assumed to be interested in survival in the sense that x(t) be positive. In particular, starting with a large time X(0) = X, he is interested in the probability of surviving for a large time t. The following cases are considered: (1) where the opportunities are fixed; (2) where the opportunities are random; (3) where 2 individuals are deriving resources from the environment; (4) a leadership problem; (5) a spend-thrift's problem; and (6) surviving as long as possible.

AD-291 879 Div. 15
(TISTP/TL) OTS price $2.60

Research Triangle Inst., Durham, N. C.
THE EXTENSION OF THE VON MISES AND FISHER VECTOR DISTRIBUTIONS TO HIGHER DIMENSIONS,
by M. A. Stephens. 8 Nov 62, 20p. 19 refs.
(Technical rept. no. 9)
(Contract Nonr-342300; In cooperation with Toronto U.)
Unclassified report

DESCRIPTORS: *Vector analysis, *Statistical distribution, *Probability, Integrals, Differential equations, Bessel equations, Partial differential equations, Spheres.

16. MEDICAL SCIENCES

AD-291 201 Div. 16
(TISTB/MD) OTS price $1.10

Harvard U., Cambridge, Mass.
NUTRITION AND CIRRHOSIS OF THE LIVER.
Report for 1 Jan-1 Dec 62,
by G. Kenneth Mallory and Richard A. MacDonald.
1 Dec 62, 4p.
(Contract DA 49-007-md-863)
Unclassified report

DESCRIPTORS: *Liver, Regeneration, Amphibians, Mammals, Man, Laboratory animals, Parabiosis, Nutrition, Deficiency diseases, Alcoholism, Hemochromatosis, Pathology.

Regeneration of the liver: (1) It was found that to stimulate regeneration in rat liver, it was necessary to remove a threshold amount, 9 to 12 per cent of the organ. Above that amount, regenerative response was directly proportional to the amount of liver removed. (2) Regeneration in amphibia was similar to that in mammals. (3) Regeneration of liver cells after common bile duct obstruction in rats was not transmitted to nonoperated parabiotic partners. Iron diseases of the liver: (1) At the Boston City Hospital, where hemochromatosis is unusually common, histologically demonstrable iron was found in the liver in 40 to 60 per cent of all patients coming to autopsy or liver biopsy. (2) Similar occurrence of tissue iron, but in lesser quantities, was found in Caucasians in South Africa. Pathogenesis of cirrhosis that follows fatty liver: In experimental animals and in humans, it was found that one of the earliest changes leading to development of fibrous tissue was proliferation of lymphatic cells, and vascular cells from central and portal veins, lining sinusoids, and from branches of the hepatic artery. These formed the well-known intrahepatic vascular shunts of cirrhosis; many of these vascular channels lost their lumens to become dense ''fibrous'' scars. It is possible that obstruction of blood flow through sinusoids, of lymphatics, and in later stages, of bile ducts within the livers, is important in the development of cirrhosis. (Author)

AD-291 217 Div. 16
(TISTB/MD) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
STUDIES WITH A SIMULATED MARTIAN ENVIRONMENT. BACTERIAL SURVIVAL AND SOIL MOISTURE CONTENT,
by Thomas L. Roberts and E. Staten Wynne. Nov 62, 3p. incl. tables, 9 refs. (Rept. no. SAM TDR 62-121)
Unclassified report

DESCRIPTORS: *Mars, *Bacteria, Growth, Soils, Moisture, Simulation.

In a simulated Martian environment based on the latest available data, colony counts of a spore-forming bacterium increased. There were no changes in soil moisture. Multiple entry into Mars jars did not affect counts or soil moisture. (Author)

AD-291 249 Div. 16
(TISTB/LMH) OTS price $1.60

Tulane U. School of Medicine, New Orleans, La.
THE EFFECTS OF ADAPTATION TO PHYSICAL TRAUMA ON IRRADIATION SENSITIVITY.
Annual rept., 1 Jan-31 Dec 62,
by John K. Hampton, Jr. 31 Dec 62, 19p.
(Contract DA 49-007-md-525)
Unclassified report

DESCRIPTORS: *Primates, *Traumatic shock, Blood, Blood chemistry, X rays, Bone marrow, Genetics, Diet, Diseases, Antigens, Glands, Radiation injuries, Radiation effects.

Studies are described on the requisite care and handling regime for the marmoset, oedipomidas oedipus. Also included were basic physiological values, especially hematological, which have been acquired to date. The parasitism of these animals is a significant problem to their use and has received considerable attention with several efforts at therapy giving poor results. (Author)

AD-291 549 Div. 16
(TISTB/SAT) OTS price $1.60

Entomology Research Div., Agricultural Research Service, Orlando, Fla.
THE EFFECTS OF A CHEMOSTERILANT ON MALARIA IN MOSQUITOES.
Final rept., 20 Feb-30 Nov 62 on Investigations to Determine the Effects of Insecticides (Including Chemosterilants) on Insects Infected with Pathogens,
by Robert M. Altman. 30 Nov 62, 16p. incl. tables, 5 refs. (Proj. 6X61-13-001)
Unclassified report

DESCRIPTORS: *Malaria, *Chemotherapeutic agents, Sterilizers, Plasmodium, Mosquitoes, Therapy, Control.

Studies were conducted to determine the effects of the chemosterilant tepa on Plasmodium gallinaceum in Aedes aegypti. It was demonstrated that holding the mosquitoes on a tepa residue of 10 mg./sq. ft. either immediately before or after they fed on infected chicks caused a reduction in the percentage of mosquitoes that became infected and a reduction in the mean oocyst count. Similar exposures also caused reductions in malaria transmission rates.
Other experiments demonstrated that tepa reduced the malaria transmission rates when mosquitoes infected for more than 14 days were held on a tepa residue of 10 mg./sq. ft. Malaria did not develop in 35 of 36 mosquitoes that fed on infected chicks one hour after they were inoculated intraperitoneally with tepa at the rate of 100 mg./kg. Malaria developed in chicks following intramuscular inoculation with blood samples taken from infected chicks one hour after they were inoculated intraperitoneally with tepa. (Author)

AD-291 562 Div. 16
(TISTB/LMH) OTS price $1.60

Colorado U., Boulder.
MAGNETIC SUSCEPTIBILITY OF SINGLE BIOLOGICAL CELLS.
Annual progress rept., 2 Dec 61-1 Dec 62,
by S. J. Gill and M. Downing. 25 Nov 62, 12p. illus.
(Contract Nonr-114708, Proj. NR 108 435)
Unclassified report

DESCRIPTORS: *Cells (Biology), *Tissues (Biology), Blood, Microscopy, Medical equipment, Laboratory equipment, Design, Culture media, Magnetic susceptibility, Magnetic properties.

A method for measuring the magnetic susceptibility of single cell particles in the 5 to 50 micron range was developed. The method has been used to explore the magnetic properties of several biological cellular systems. The most successful results have been obtained with red

blood cells. The blood cells within a given sample appear to have a slight spread of magnetic susceptibility about an average value which corresponds well with a macroscopic measurement on many cells. Normal and spherated blood cells have been studied at different oxygen saturation conditions by both single particle and macroscopic techniques. New experimental techniques for measuring magnetic properties of particles smaller that 5 microns have been explored. (Author)

AD-291 573 Div. 16
(TISTB/SAT) OTS price $1.60

Keio U. School of Medicine, Tokyo (Japan).
TREATMENT OF TOXOPLASMOSIS.
Rept. no. 1 (Final), 15 Oct 61-14 Oct 62, by Hisakichi Matsubayashi. 14 Oct 62, 11p. incl. illus. tables, 11 refs.
(Contract DA 92-557-FEC-35637)
Unclassified report

DESCRIPTORS: *Toxoplasmosis, *Chemotherapeutic agents, Pyrimidines, Japan, Guanidines, Triazines, Sulfones, Therapy.

Screening tests of various kinds of compounds were carried out with the purpose of obtaining new drugs for toxoplasmosis. Compounds tested were 66 pyrimidine derivatives, 14 guanidine derivatives, 11 triazine derivatives, 12 sulfone derivatives, 1 amidine derivatives and 4 sulfadrugs. Mice inoculated with 100,000 Toxoplasmas of RH strain were used for the tests. The compounds to be tested were given intraperitoneally for five days successively, starting one day before the inoculation. The dose was 1/15 amount of LD50 of each compound. The effect of the compound was evaluated by difference in survival days between the test and the control animals. None of the derivatives of pyrimidine, guanidine, triazine, amidine and sulfa-drugs so far tested was proved to be more effective than pyrimethamine. The average survival period of the animals treated with pyrimethamine was twice as long as that of the control groups. Among the sulfone derivatives, 4-Nitro-4'-formylamino-diphenylsulfone and 4-Nitro-4'-acetoamino-diphenylsulfone seemed to be a little more effective than pyrimethamine regarding prolongation of the survival period. 4-Nitro-4'-formylamino-diphenylsulfone was most effective, i.e., 2 out of 6 mice treated with oral administration of this derivative were considered to be cured. By these results it was expected that 4-Nitro-4'-formylamino-difenylsulfone might be effective in treatments of human toxoplasmosis. (Author)

AD-291 635 Div. 16
(TISTB/SAT) OTS price $11.00

Biological Labs., Frederick, Md.
ANTHRAX,
ed. by B. N. Pastukhov. 1 Aug 62, 141p. incl. tables (Trans. no. 683)
Unclassified report

DESCRIPTORS: *Anthrax, *Diseases, *Veterinary medicine, Immunization, Diagnosis, Sanitary engineering, Etiology, USSR, Animals.

AD-291 637 Div. 16
(TISTB/SAT) OTS price $1.60

Biological Labs., Frederick, Md.
CHARACTERISTICS OF THE POLYSACCHARIDE-CONTAINING FRACTION FROM PASTEURELLA PESTIS,
by Ye. E. Bakhrakh, V. D. Yegorova, and L. P. Pavlova. 27 Sep 62, 11p. incl. illus. 12 refs. (Trans. no. 691 from Zhurnal Mikrobiologii No. 6, pp. 126-130, 1962)
Unclassified report

DESCRIPTORS: *Pasteurella pestis, *Chemical analysis, USSR, Chromatographic analysis, Amino acids, Saccharides, Plague.

The preparation isolated by the White method from Past. pestis does not represent a pure polysaccharide. Non-purified fractions contained a considerable amount of protein admixtures, from which it could be separated via repeated, fractionated precipitation with alcohol, processing with chloroform as per Sevag, prolonged hydrolysis with 0.1 N acetic acid, or protein precipitation with trichloracetic acid. The preparation purified of protein admixtures represents a stable polysaccharide-polypeptide complex possessing serological activity and the property of inducing a positive allergic reaction in guinea pigs which had recovered from plague or had been immunized against this infection. Removal of the polypeptide portion of the complex by means of trypsin-processing led to a marked reduction of the allergic effect of the preparation. (Author)

AD-291 638 Div. 16
(TISTB/SAT) OTS price $1.60

Biological Labs., Frederick, Md.
EFFECT OF CORTISONE ON THE COURSE OF THE INFECTIOUS PROCESS IN WHITE MICE INFECTED WITH PATHOGENIC MICROORGANISMS,
by G. V. Yushchenko, M. P. Tereshchenko and others. Sep 62, 12p. incl. illus. tables, 8 refs. (Trans. no. 692)
Unclassified report

DESCRIPTORS: *Infections, *Adrenal cortical extract, *Microorganisms, USSR, Pathology, Plague, Tularemia, Typhoid, Diagnosis, Diseases, Detection.

Under experimental conditions cortisone considerably increased the sensitivity of white mice to pseudotuberculosis, listerellosis, pasteurellosis, erysipeloid, and salmonellosis; therefore, cortisone-treated white mice can be employed as a very sensitive biotest in carrying out corresponding analyses. Cortisone markedly increased the sensitivity of white mice to the vaccine culture of plague and tularemia microorganisms and thus, can be utilized in individual experimental investigations. In experiments with highly virulent tularemia and plague cultures, to which white mice are highly sensitive even without cortisone, no further increase has been observed in the sensitivity of animals to infection (tularemia), or their sensitivity increased only slightly (plague). Upon examination of wild rodents in the natural plague nidi, no advantages could be elicited from the use of cortisone-treated white mice for biological tests. (Author)

AD-291 639 Div. 16
(TISTB/SAT) OTS price $1.10

Biological Labs., Frederick, Md.
PARASITOLOGICAL FACTORS IN THE NATURAL FOCI OF TAIGA ENCEPHALITIS,
by Ye. N. Pavlovskiy. Dec 62, 5p. (Trans. no. 699 from Zoologicheskiy Zhurnal 19:2, pp. 333-335, 1940)
Unclassified report

DESCRIPTORS: *Encephalitis viruses, *Ticks, *Virus diseases, USSR, Disease carriers, Serum, Etiology, Analysis.

Studies were made in inhabited and wild taiga. In the former, studies of Ixodes persulcatus ticks for the virus of spring-summer (taiga) encephalitis were all negative; in the latter, extensively positive. The same applied to the mammalian hosts. Haemaphysalis concinna ticks were shown to be virus vectors from nymph to adult stages and to transmit the virus transovarially to their progeny. Spontaneously infected Dermacentor silvarum ticks were also found. Mice can be infected with emulsions of I. persulcatus organs or may, instead, become immune. The same alternatives hold in the case of infected tick bites. Which of the two occurs depends on the quantity of virus inoculated, which, in turn, is related to the number of ticks biting, the degree to which they are infected, the duration of blood-sucking; also important here are the conditions of the virus, the environment and the animal. There is no doubt that the same factors operate when man is bitten by infected ticks. The fact that high serum antibody titers are found in man and cattle in the wild taiga, low titers in the inhabited taiga, and an intermediate situation at a place between the two is cited as proof. (Author)

AD-291 804 Div. 16, 30
(TISTB/CCH) OTS price $1.60

RAND Corp., Santa Monica, Calif.
AN ELEMENTARY CORTICAL CYLINDER,
by E. W. Paxson. Nov 62, 10p. incl. illus. tables, 2 refs. (Memo. no. RM-3405-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Neuromuscular transmission, Nerves, Nervous system, Electronics, Cerebral cortex, Simulation.

A simple initial model designed to check out the 7090 program for neural nets (see RM-3406-PR) is described and the results of computation given. The model is grossly analogous to a small cylinder through the cortex. (Author)

AD-291 805 Div. 16, 30
(TISTB/DGH) OTS price $1.60

RAND Corp., Santa Monica, Calif.
A GENERAL NEURAL NET,
by E. W. Paxson and J. W. Smith. Nov 62, 13p. incl. illus. (Memo. no. RM-3406-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Neuromuscular transmission, *Computers, Coding, Simulation, Nerves, Cells (Biology), Programming.

A neural net is discussed which is general in that (1) connectivity and transmission times along links are at the pleasure of a net's constructer, (2) time is not quantized (except as demanded by the grain of the computation), (3) eight of the synaptic mechanisms distinguished by Bullock are permitted, and (4) the assisted synaptic learning theory of Milner is included. The net has been coded for the IBM 7090. (Author)

AD-291 817 Div. 16
(TISTB/MS) OTS price $2.60

Texas U., Austin.
THE MATHEMATICAL ANALYSIS OF HEAT TRANSFER AND TEMPERATURE RELATIONS IN THE HUMAN BODY.
Final rept., 1 Mar 59-15 Nov 62,
by Eugene H. Wissler. 15 Nov 62, 21p. incl. illus. 8 refs. (Rept. no. 6)
(Contract DA 49-193-md-2005)
Unclassified report

DESCRIPTORS: *Body temperature, *Heat production (Biology), *Heat transfer, Temperature, Metabolism, Thermal conductivity, Physiology, Mathematical analysis.

The synthesis of an adequate mathematical model for the human thermal system must include the following factors: (1) the manner in which heat generated by metabolic reactions is distributed throughout the body, (2) conduction of heat due to thermal gradients, (3) convection of heat by circulating blood, (4) the geometry of the body, (5) the relatively low thermal conductivity of the superficial layer of fat and skin, (6) countercurrent heat exchange between large arteries and veins, (7) heat loss through the respiratory tract, (8) sweating, (9) shivering, (10) the storage of heat, and (11) the condition of the environment, including its temperature, motion relative to the body, and relative humidity. This report describes the progress which was made on the synthesis of such a model. (Author)

AD-291 853 Div. 16
(TISTB/CCH) OTS price $1.10

Louisville U., School of Medicine, Ky.
STEROID-PROTEIN INTERACTIONS.
Annual progress rept., 1 Apr-15 Dec 62,
by Ulrich F. Westphal. 15 Dec 62, 5p.
(Contract DA 49-193-md-2263)
Unclassified report

DESCRIPTORS: *Proteins, *Corticosteroids, Surgery, Biochemistry.

Studies on Sprague-Dawley rats have shown that the high-affinity corticosteroid-binding activity of serum increases after adrenalectomy or hypophysectromy. This increase becomes apparent between the first and second day after adrenalectomy, goes up to approximately twice the normal binding activity and remains at this level for at least 3 weeks. Injection of large doses of corticosterone into the adrenalectomized rat decreases the corticosteroid-binding activity to the same low level as observed in normal rats after injection of the same dose of corticosterone. A species-specificity was demonstrated: the binding protein in rat serum was found to bind corticosterone more firmly than cortisol, whereas the opposite relationship was observed for human transcortin. Electrophoretic studies showed the corticosteroid-binding protein in rat serum to be an alpha globulin. (Author)

AD-291 854 Div. 16
(TISTB/MD) OTS price $3.60

Biological Labs., Frederick, Md.
BIBLIOGRAPHY ON PSITTACOSIS.
Jan 50, 33p.
Unclassified report

DESCRIPTORS: *Bibliography, *Virus pneumonia, Epidemiology, Chemotherapeutic agents.

A comprehensive bibliography on psittacosis which includes papers published in the 1800's to January, 1950 is presented. References are grouped under one of the following headings: General; Clinical picture, case reports; Epidemiology, statistice, incidence; Treatment, prevention, control; Etiology, laboratory studies; and Experimental infections; Host range. (Author)

AD-291 890 Div. 16
(TISTB/CCH) OTS price $1.60

Tuskegee Inst., Ala.
FACTORS IN THE VIRULENCE AND IMMUNOGENICITY OF LISTERIA MONOCYTOGENES.
Final technical rept., 1 Oct 61-30 Sep 62, by Augustine N. Njoku-Obi. 30 Sep 62, 11p. incl. table, 6 refs.
(Grant DA-MD-49-193-62-G44)
Unclassified report

DESCRIPTORS: *Streptolysins, Immunology, Biochemistry, Microbiology, Bacteria, Toxicity.

Studies on the hemolysins of Listeria monocytogenes were shown to be protein in nature, with the relative electrophoretic mobility of gamma type globulins, and are antigenic in the rabbit. The amount of hemolysin produced was dependent on the strain, the time and temperature of incubation, and the state of the medium (broth or solid). Common hydrocolloids added to the broth medium increased the titer of the hemolysins produced and prevented their early deterioration. The hemolysins are oxygen sensitive and heat labile. While inducting no detectable toxicity in the intact mice or skin necrosis in the rabbit, the hemolysins appear to exert cytolytic effect on isolated mouse peritoneal exudate cells. An investigation into the nature of avirulence indicates the probable role of cytotoxic factor/s, produced during growth in the host, on the establishment of infection and the production of overt disease. A highly toxic polysaccharide was isolated from some strains of Listeria monocytogenes and is under study. (Author)

17. METALLURGY

AD-291 242 Div. 17, 26
(TISTM/BRW) OTS price $3.60

Naval Ordnance Test Station, China Lake, Calif.
METALLURGICAL PROPERTIES OF EXPLOSIVELY WORK-HARDENED STEELS,
by George A. Hayes. Oct 62, 32p. incl. illus. tables, 20 refs. (NOTS TP 3022)
(NAVWEPS rept. no. 8035)
Unclassified report

DESCRIPTORS: *Steel, *Metal plates, Explosive forming, Deformation, Explosives, Microstructure, Loading, Hardening.

An experimental study of permanent property changes induced in metal plates by contact explosive charges is discussed. Quantitative microhardness and microstructural data are presented for four steels (1015, 1030, 1050, 4130) that were impulsively loaded with high-explosive charges of different thicknesses. (Author)

AD-291 400 Div. 17
(TISTM/BRW) OTS price $1.25

Watervliet Arsenal, N. Y.
A STUDY OF WELD HEAT-AFFECTED ZONES IN THE TITANIUM - 6Al-6V-2Sn ALLOY,
by Richard E. Lewis and Keh-Chang Wu. Sep 62, 43p. incl. illus. tables, 36 refs. (Technical rept. no. WVT-11-6215)
Unclassified report

DESCRIPTORS: *Titanium alloys, Phase transitions, Mechanical properties, Aluminum alloys, Vanadium, Tin alloys, X-ray diffraction analysis, Microstructure, Heat treatment, Aging, Photographic analysis, Welds.

A new high-strength alpha-beta type Ti alloy was recently developed which is heat treatable to useful yield strengths above 180,000 psi, with 7% elongation, 16% reduction in area, and 7 ft-lbs. Charpy V-notch impact energy at -40F. This study was performed to determine resultant toughness in the heat-affected zones for various welding conditions. Preheat was the most influential factor in retaining toughness in solution treated and aged base metal; welding without it caused severe losses in impact strength and notched tensile strength which could not be recovered by aging treatments afterwards or resolution treating and aging. Mechanisms causing changes in properties involving beta to alpha and beta to alpha prime on cooling, and alpha prime to alpha + beta and beta to alpha upon reheating were studies by X-ray diffraction volumetric analysis and photomicrographic techniques. No evidence of omega phase forming or transforming was found in the aging procedures studied. (Author)

AD-291 405 Div. 17, 26
(TISTM/ODN) OTS price $3.60

Marquardt Corp., Van Nuys, Calif.
MECHANICAL PROPERTIES OF 310, 316, AND 316L STAINLESS STEEL SHEET ALLOYS AT ELEVATED TEMPERATURES,
by A. S. Rabensteine. 1 Dec 62, 34p. incl. illus.
(Rept. no. RP 281-2Q-1)
(Contract AF 33(657)8706, Proj. 281)
Unclassified report

DESCRIPTORS: *Alloys, *Stainless steel, Tensile properties, Sheets, Heat treatment, Creep, Stresses, Rupture, Chromium alloys, Nickel alloys, Chemical analysis, Elasticity, Deformation, Loading, Mechanical properties.

Short time tensile properties at temperatures ranging from room temperature to 2200 F are presented for Type 310 (0.062 inch) stainless steel sheet. Creep properties at temperatures from 1400 to 2200 F are included. Short time tensile properties at temperatures ranging from room temperature to 1600 F are presented for Types 316 and 316L (0.010 inch) stainless steel sheet. Creep properties at temperatures from 1000 to 1400 F are included for Type 316L only. Strain rates for Type 310 = 0.001 in./in./sec to yield strength then 0.01 in./in./sec to rupture and 0.01 in./in./sec to yield strength then 0.1 in./in./sec to rupture. Strain rates for Types 316 and 316L = 0.001 in./in./sec to yield strength then 0.01 in./in./sec to rupture and 0.00001 in./in./sec to yield strength and 0.01 in./in./sec to rupture. (Author)

AD-291 406 Div. 17, 26
(TISTM/ODN) OTS price $3.60

Marquardt Corp., Van Nuys, Calif.
SELECTED MECHANICAL PROPERTIES OF HASTELLOY C

ALLOY PLATE (0.250-INCH) AND FORGING,
by A. S. Rabensteine. 1 Dec 62, 34p. incl. illus. tables (Rept. no. PR 281-2Q-2)
(Contract AF 33(657)8706, Proj. 281)
Unclassified report

DESCRIPTORS: *Alloys, *Metals, Forging, Tensile properties, Creep, Heat treatment, Rupture, Melting, Welding, Nickel alloys, Molybdenum alloys, Chromium alloys, Elasticity, Chemical analysis, Tests, Stresses, Mechanical properties, Welds.

A program was conducted to evaluate the mechanical properties of Hastelloy C alloy plate (parent metal and welds) and forging. The program included tests to determine tensile and creep properties, also cyclic tests simulating a service profile. Hastelloy C alloy plate 0.250 inch thick and material cut from a large ring forging were investigated. The following properties were obtained: Air melted plate: short time tensile properties at RT to 1600F; creep-rupture properties at 1200, 1400, and 1600F. Vacuum melted plate (parent metal and welds): short time tensile properties at RT and 1400F; short time tensile properties (aged vs. non-aged at RT and 1400F); creep-rupture properties at 1400F; plastic creep measured after 17, 25, and 35 cycles. Vacuum melted forged ring: short time tensile properties (various heat treatments). (Author)

AD-291 407 Div. 17, 26
(TISTM/ODN) OTS price $4.60

Marquardt Corp., Van Nuys, Calif.
MECHANICAL PROPERTIES OF COMMERICALLY PURE SINTERED TUNGSTEN ALLOY SHEET FROM ROOM TEMPERATURE TO 4500 F,
by A. S. Rabensteine. 1 Dec 62, 37p. incl. illus. tables, 2 refs. (Rept. no. PR 281-2Q-3)
(Contract AF 33(657)8706, Proj. 281)
Unclassified report

DESCRIPTORS: *Alloys, *Tungsten alloys, *Sintered alloys, Heat treatment, Creep, Rupture, Stresses, Deformation, Tensile properties, Thickness, Argon, Elasticity, Refractory materials, Refractory coatings, Tantalum alloys, Molybdenum alloys, Niobium, Microstructure, Mechanical properties, Sheets.

Tensile properties of commercially pure sintered tungsten sheet are presented at test temperatures ranging from room temperature to 4500 F for 0.020-inch thick material and from 1500 to 4500 F for 0.045-inch thick material. Creep-rupture properties at temperatures ranging from 2000 to 4500 F for both the 0.020 and 0.045-inch thick material are included. Bend transition-temperature test data for 0.030-inch thick material are presented at temperatures ranging from 200 to 540 F using I T and 2 T radii. Conditions were as follows: strain rate to YS = 0.001 in./in./sec; strain rate from YS to UTS = 0.01 in./in./sec; gage length = 1.0 inch; material condition = uncoated, as rolled, and stress relieved; test atmosphere = argon - 7% hydrogen; test direction for tensile and creep-rupture tests = longitudinal to rolling; test direction for bend transition-temperature tests = transverse to rolling. (Author)

AD-291 452 Div. 17
(TISTM/BRW) OTS price $8.60

Torino U. (Italy).
ON THE INFLUENCE OF SMALL AMOUNTS OF IMPURITIES ON RECRYSTALLIZATION AND GRAIN GROWTH OF HIGH PURITY IRON. NOTE II. ON EFFECT OF INTERSTITIALS CARBON AND NITROGEN AND ON EFFECT OF PRECIPITATES.
Final technical rept.
Oct 62, 92p. incl. illus. table, 13 refs.
(Contract DA 91-591-EUC-1832)
Unclassified report

DESCRIPTORS: *Iron, *Crystallization, Impurities, Chemical impurities, Carbon, Nitrogen, Grains (Metallurgy), Growth, Crystallization, Crystal structure, Precipitation, Nucleation, Internal friction.

Effort was continued on the effect of impurities on recrystallization of pure iron. Data obtained on the following points are reported: (1) isothermal recovery and recrystallization at different temperatures for specimens containing small increasing additions of carbon, (2) isochronal and isothermal recovery and recrystallization at different temperatures for specimens containing small increasing additions of nitrogen, (3) differences in the density of the recrystallization nuclei for specimens containing C or N and also for a sample prepared by melting with some precipitated oxide, and (4) internal friction due to grain boundary relaxation for specimens with increasing additions of nitrogen. The results are analyzed in terms of current recrystallization theories and average nucleation and grain growth rates are determined as a function of temperature and time. The results obtained show that in pure iron very strong recovery effects are present prior to any trace of recrystallization. Carbon and nitrogen have similar effects and act in the sense of blocking almost any recovery up to the temperature at which recrystallization occurs. On the contrary carbon and nitrogen in alpha solid solution have only a negligible effect on the speed of primary recrystallization. (Author)

AD-291 456 Div. 17, 25, 7
(TISTM/BRW) OTS price $3.60

David Sarnoff Research Center, Princeton, N. J.
THERMOELECTRIC MATERIALS FOR POWER CONVERSION.
Quarterly progress rept. no. 4 (Final),
1 Feb 61-31 Jan 62,
by B. Abeles, G. D. Cody and others. 15 Feb 62, 32p. incl. illus. tables, refs.
(Contract NObs-84660)
Unclassified report

DESCRIPTORS: *Materials, *Semiconductors, Silicon alloys, Germanium alloys, Thermal conductivity, Measurement, Power supplies, High temperature research, Thermocouples, Silicides, Sulfides, Tellurides, Thermoelectricity, Thermal diffusion.

A useful thermoelectric material has been discovered as a result of the research program described in this report. The discovery arose from the measurement of thermal diffusivity at elevated temperatures of a series of heavily doped silicon-germanium alloys. The results showed that at elevated temperatures these materials had a lower conductivity than had been expected on the basis of existing theory. The thermal conductivity values were sufficiently low so that the thermoelectric figure of merit was raised to usefully high values at elevated temperatures. Practical thermoelectric power generators have been made from silicon-germanium alloys. In addition, this report describes

materials research on ternary compounds and alloys, metal trisilicides, and rare earth silicides. Measurements of thermal diffusivity of semiconductors at high temperatures are described together with efficiency measurements on power generating thermocouples. (Author)

AD-291 481 Div. 17, 27
(TISTM/ODN) OTS price $1.10

Aerojet-General Corp., Azusa, Calif.
INVESTIGATION OF STRESS-CORROSION CRACKING OF HIGH-STRENGTH ALLOYS.
Informal progress rept. no. 19,1-31 Oct 62, 12 Dec 62, 4p. incl. table (Rept. no L0414-01-19)
(Contract DA 04-495-ORD-3069)
Unclassified report

DESCRIPTORS: *Alloys, *Steel, *Titanium alloys, Rocket cases, Coatings, Nickel alloys, Aluminum alloys, Stresses, Cobalt alloys, Corrosion, Fracture (Mechanics).

Stress-corrosion cracking characteristics of new high-strength alloys of interest for rocket motor case applications were investigated. These alloys are 6Al-4V titanium, 18% nickel maraging steel, and 20% nickel maraging steel, in addition to limited testing of vacuum-melted 9 Ni-4Co steel. Environmental parameters that could affect the rate and extent of stress-corrosion cracking, and the effect of material parameters (composition, strength level, welding, and microstructure) on stress-corrosion susceptibility were studied. Evaluation of protective coatings and other techniques for preventing stress-corrosion cracking was included. (Author)

AD-291 482 Div. 17, 14, 30
(TISTM/TCG) OTS price $6.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
MECHANICAL BEHAVIOR OF STRUCTURAL MATERIALS UNDER GENERAL STRESS AND RAPID HEATING CONDITIONS,
by C. W. Austin. 29 June 62, 59p. incl. illus. 101 refs. (Rept. no. RR-TR-62-5)
Unclassified report

DESCRIPTORS: *Materials, *Structures, *Bibliography, Tensile properties, Stresses, Creep, Heat treatment, Microstructure, Deformation, Fracture (Mechanics), Theory, Energy, Steel, Alloys, Aluminum alloys, Rocket cases, Mechanical properties.

This report is a survey of literature concerning the mechanical behavior of structural materials under general stress and rapid heating conditions, with emphasis on test methods and test parameters applicable to missile structural design. The survey indicates that additional research, both applied and basic, is warranted in certain areas where there is a lack of pertinent data or a need for more fundamental information on the behavior of materials. The lack of adequate information concerning the behavior of materials subjected to general stress conditions with superimposed transient heating is particularly evident. (Author)

AD-291 513 Div. 17, 26
(TISTM/BRW) OTS price $1.60

Armour Research Foundation, Chicago, Ill.
HIGH-TEMPERATURE OXIDATION PROTECTIVE COATINGS FOR VANADIUM-BASE ALLOYS.
Bimonthly rept. no. 1, 13 Sep-12 Nov 62,
by J. J. Rausch and F. C. Holtz. 10 Dec 62, 10p. incl. table (Rept. no. ARF-B6001-1)
(Contract N600(19)59182)
Unclassified report

DESCRIPTORS: *Vanadium alloys, *Refractory coatings, Silicides, Oxidation inhibitors, Nickel alloys, Cobalt alloys, Niobium alloys, Titanium alloys, Powder metals, Silicon, Airframes, High temperature research, Manufacturing methods.

The basic parameters relating to the pack-siliconizing of V-base alloys are being investigated with the objective of optimizing protective capability and reliability. Coating time, temperature, and the effect of double processing are being evaluated and relationships drawn to the accompanying oxidation resistance and reproducibility. Oxidation behavior and other properties of compounds based on (V, Nb) Ni2, (V, Nb) Ni3, (V, Nb) Co2, and (V, Nb) Co3 were studied at 2000 and 2200 F. Cobalt-containing compounds had relatively poor oxidation resistance, whereas most of the nickel-base compositions exhibited low weight changes. (Author)

AD-291 548 Div. 17
(TISTM/BRW) OTS price $3.60

Pitman-Dunn Labs. Group, Frankford Arsenal, Philadelphia, Pa.
RESIDUAL STRESS IN HARDENED STEEL CYLINDERS,
by E. H. Hess.
July 62, 32p. incl. illus. table, 5 refs. (Rept. no. R-1651)
(Proj. 50201008)
Unclassified report

DESCRIPTORS: *Steel, Cylindrical bodies, Heat treatment, Hardness, Spark machining, Electroerosive machining, Strain gages, Measurement, Stresses.

A study was conducted to (1) measure residual stress in hardened steel solid cylinders, (2) correlate the stress values with heat treatments, and (3) develop a dissolution technique. Residual stress patterns for 12 solid cylinders of 4160 steel, heat treated by various methods, were determined. Comparison of the results was fair except for stress values near the center line and surface. An electrolytic method (the Mesnager-Sachs procedure) was used for enlarging holes in steel cylinders in order that the effect of bore metal removal could be detected as change in strain on the surface. With the view of preventing possible cracking in storage, it was concluded that (1) cylinders quenched in hot water had the most favorable stress pattern, (2) marquenched, and oil quenched cylinders had the next most favorable pattern, (3) residual stress in brine quenched cylinders approached the ultimate strength of the steel and in some instances caused cracking, and (4) stress patterns of interrupted quench specimens were not consistent enough to warrant a conclusion. (Author)

AD-291 650 Div. 17, 26
(TISTM/TCG) OTS price $1.60

Westinghouse Electric Corp., Blairsville, Pa.
MOLYBDENUM FORGING PROCESS DEVELOPMENT.
Interim technical progress rept. no. 7, 25 Jan-15 June 62,
by A. W. Goldenstein. 15 June 62, 9p. incl. illus.
(Contract AF 33(600)41419, Proj. 7-756)
(ASD TD 7-756, vol. 7) Unclassified report

DESCRIPTORS: *Molybdenum alloys, *Forging, Processing, Dies, Design, Extrusion, Tensile properties, Stresses, Fracture (Mechanics), Failure (Mechanics), Metal coatings, Zirconium compounds, Aluminum compounds, Oxides, Glass, Lubricants, Non-destructive testing, Ultrasonics, Castings, Machining, Quality control.

The main effort on Phase IV to date has been directed towards arriving at a forging design suitable for use on the balance of the program. A search for such a forging and a review of prints received as a result of earlier inquiries were not rewarding in that no shapes were found which were suitable without extensive modification. A flame shield forging to be produced from sintered unalloyed Mo was redesigned to fit contract requirements and submitted for approval. Subsequent to approval of the above design closed impression forging dies for blocking and for finishing operations were designed and are being machined. The material required to complete Phase IV has been forged to an intermediate stage where it will be held until dies and forging blank geometry have been checked out. A number of blank shapes are being considered and will be evaluated when forging dies have been machined and heat treated. (Author)

AD-291 651 Div. 17, 25
(TISTM/EJH) OTS price $1.10

Keck, W. M., Lab. of Engineering Materials, Calif. Inst. of Tech., Pasadena.
HEXAGONAL CLOSE-PACKED STRUCTURES IN Bi-Pb ALLOYS AND THE POLYMORPHISM OF LEAD AT HIGH PRESSURE,
by W. Klement, Jr. Oct 62, 7p. incl. 16 refs.
(Technical rept. no. 9)
(Contract Nonr-22030)
Unclassified report

DESCRIPTORS: *Lead, *Lead alloys, *Bismuth alloys, *Lattices, High pressure research, Phase transitions, Solids, Solutions, Processing, Cooling, Crystal structure.

Lattice spacings were obtained for the hexagonal close-packed structures in lead alloys containing 27.0 to 32.0 at .% bismuth, which were rapidly cooled from the melt. Axial ratios for these structures vary from 1.653 to 1.654. By extrapolation to pure lead of these volume/atom determinations and of some activity data, the free energy of hexagonal close-packed lead relative to the face-centered cubic form is estimated. It is suggested that the structure of the lead polymorph stable at pressures greater than 0.16 Mbar is hexagonal close-packed. (Author)

AD-291 664 Div. 17, 26, 22
(TISTM/REB) OTS price $1.60

Pitman-Dunn Labs. Group, Frankford Arsenal, Philadelphia, Pa.
FABRICATION OF THIN WALLED SHAPED CHARGE LINERS BY POWDER METALLURGY,
by F. I. Zaleski and R. A. Powell. Oct 60, 17p. incl. illus. (Rept. no. A60-8)
(DA Proj. 59332003)
Unclassified report

DESCRIPTORS: *Powder metallurgy, *Shaped charges, *Cavity liners, Copper, Powder metals, Tensile properties, Antitank ammunition, High explosive ammunition, Rockets, Sintering, Manufacturing methods.

A unique powder metallurgy method was developed for producing dimensionally acceptable high density shaped charge liners from copper powders for the M28A2 rocket. The problems involved in tool design and processing of this thin walled cone are discussed. A number of cones were produced to the specified dimensions from various commercial copper powders. A powder with good flow characteristics appeared to be the main requirement. This insured a uniform fill of powder in the die cavity, provided good dimensional control and minimum density variation in the cone. The best combination of properties was obtained on cones produced from copper powders containing approximately 40 to 60% fines (-325 mesh) and sintered at 1650 F. The average density of the finished cone was 8.4 gm/cc, which is 94% of the theoretical density of Cu. Typical tensile properties of these cones were 30,400 psi tensile strength and 31% elongation. (Author)

AD-291 808 Div. 17
(TISTM/ODN) OTS price $1.10

Southern Research Inst., Birmingham, Ala.
DEVELOPMENT OF HIGH STRENGTH AND FRACTURE TOUGHNESS IN STEELS THROUGH STRAIN-INDUCED TRANSFORMATIONS.
Quarterly progress rept. no. 1, 2 July-30 Sep 62, by J. D. Morrison, M. A. Campbell, and J. R. Kattus. 12 Oct 62, 22p.
(Contract DA 01-009-ORD-1070)
(WAL TR 323.4/2) Unclassified report

DESCRIPTORS: *Stainless steel, *Alloys, Research program administration, Refractory materials, Fracture (Mechanics), Stresses, Rolling mills, Low temperature research, Heat treatment, Transformations.

The aim of this program is to arrive at an alloy composition and processing procedure that will produce an optimum combination of strength and toughness. Twelve variations in composition from the standard Type 301 stainless steel level will be made, and zerolled to various reductions at several temperatures. Studies of the precipitation-hardening effects of Ti and Mo additions to the standard Type 301 will be made to determine the combined effects of transformation and precipitation strengthening. Strength-property data obtained at 80 and -200 F to be reported include: 0.2%-offset yield strength, ultimate strength, elongation in 2 inches, modulus of elasticity, and fracture toughness. Experimental heats of the standard Type 301 composition and of the 0.06%-C, the 0.25%-C, and the 1.5%-Mn variations have been prepared, and the ingots are being machined into blanks for hot-breakdown rolling. (Author)

AD-291 885 Div. 17, 26
(TISTM/REB) OTS price $2.60

Universal-Cyclops Steel Corp., Bridgeville, Pa.
MOLYBDENUM SHEET ROLLING PROGRAM.
Interim rept. no. 18, 25 July-25 Oct 62, by W. A. McNeish. 25 Oct 62, 20p. incl. illus. tables.
(Contract NOa(s) 59-6142-c)
Unclassified report

DESCRIPTORS: *Molybdenum, *Molybdenum alloys, *Rolling mills, *Sheets, Processing, Manufacturing methods.

Two eight inch diameter Mo+0.5%Ti ingots for Phase III production were melted, extruded, and prepared as forging billets. The billets have been hot forged to sheet bar. TZM billets for Phase II have been hot forged and applied to the rolling schedules. Bend transition test results on recrystallized Mo+0.5%Ti and TZM sheet are presented. Short transverse tensile

test results from Boeing on Mo+0.5%Ti containing 25 to 96 percent cold work are included. Annealing time-temperature curves have been constructed for TZM, Mo+0.5%Ti, and unalloyed molybdenum. (Author)

AD-291 889 Div. 17, 25
(TISTM/REB) OTS price $1.60

Syracuse U., N. Y.
CRACK INITIATION IN METALLIC MATERIALS.
Quarterly progress rept. no. 5, 1 June-31 Aug 62, by Volker Weiss, Klaus Schroder and Paul Packman. Sep 62, 14p. incl. illus. tables, 9 refs.
(Contract NOw 61-0710-d)
Unclassified report

DESCRIPTORS: *Metals, *Titanium alloys, *Sheets, Stresses, Deformation, Alloys, Crystals (Mechanics), Theory, Fracture (Mechanics).

Initial tests with tungsten specimens showed that the original specimen geometry is not suitable for very hard and brittle material. It was found to be very difficult to drill holes of high quality finish into tungsten. Small cracks were usually produced during machining which caused the specimens to fail in the grips. It was therefore necessary to design a new specimen. Initial tests with Ti-2.5Al-16V aged to an ideally brittle condition at 700 F for 4 hours indicated that this specimen-specimen holder design operated satisfactorily from room temperature to about 600 F. The strength of the Ti-alloy shims decreases at higher temperatures, so that they deformed plastically. Hardened tool steel shims will be tried for higher temperatures. (Author)

18. MILITARY SCIENCES AND OPERATIONS

AD-291 466 Div. 18, 6
(TISTE/RD) OTS price $17.50

Westinghouse Electric Corp., Baltimore, Md.
INVESTIGATION OF OPTICS FOR A RADIATION WEAPON SYSTEM. VOLUME III.
Quarterly technical note no. 2.
1 Aug 62, 256p. incl. illus. tables, refs. (Rept. no. TPE 3221)
(Contract AF 30(602)2638)
(RADC TDR 62-421, vol. 3) Unclassified report

DESCRIPTORS: *Lasers, *Weapons, Phosphors, Sources, Fluorescence, Free radicals, Flash lamps, Excitation, Electrons, Ruby, Focusing, Materials.

This report includes:
LASER MATERIALS CONSIDERATIONS. 1 Aug 62.

LASER PUMP CONSIDERATIONS. 1 Aug 62.

FIELD PATTERNS OF FOCUSSED CONTINUOUS APERTURES AND APERTURE ARRAYS, by C. T. LaBree. 3 Aug 62, (Rept. no. NL-178)

Contents:
Laser material considerations
Laser pump considerations
Field patterns of focussed continuous apertures and aperture arrays

19. NAVIGATION

AD-291 671 Div. 19
(TISTW/PCR) OTS price $3.60

General Precision, Inc., Tarrytown, N. Y.
STUDY OF MULTI-FUNCTION SENSORS FOR GUIDANCE SUBSYSTEMS.
Quarterly technical note no. 1, 1 July-30 Sep 62, by Alan Bloch. Nov 62, 29p. incl. illus.
(Contract AF 33(657)9207)
Unclassified report

DESCRIPTORS: *Guidance, *Navigation, *Star trackers, Correlation techniques, Geometry, Detectors, Video map matching, Television display systems, Spaceships.

The development of multi-function sensors for space-vehicle guidance and navigation is described. Brief discussions of the field of image correlation are presented. A section is devoted to the special problems associated with star field tracking. (Author)

AD-291 848 Div. 19, 25
(TISTP/TL) OTS price $.75

Geophysics Corp. of America, Bedford, Mass.
INVESTIGATION OF PHYSICAL PHENOMENA FOR THE NAVIGATION OF SPACE VEHICLES AND EARTH SATELLITES.
Final rept.,
by Ali M. Naqvi. Dec 62, 20p. incl. illus. tables, 21 refs. (GCA technical rept. no. 62-24-A)
(Contract AF 33(616)7413, Proj. 9(610-5219)
(ASD TDR 62-1005) Unclassified report

DESCRIPTORS: *Celestial navigation, *Satellite vehicles, *Optical tracking, *Moon, *Light, Measurement, Stars, Intensity, Photomultiplier, Planets, Interference, Brightness, Earth, Atmosphere.

Data on phases, spectral distribution, size and figure of the moon, and the intensity of Lyman alpha reflected from the moon are presented. Preliminary design and operation of an automatic sextant for use in interplanetary vehicles is discussed. The sextant is capable of measuring angles, usually not exceeding 5 degrees, with a precision of 0.2 seconds. Various aspects of satellite navigation by terrestrial occultations of stars are discussed. A condition for occultation in terms of stellar coordinates and the orbital elements of the satellite is derived. Also an occultation equation relating the time of occultation to the orbital elements is derived. The expected frequency of occultations is discussed. A method of virtual occultation using extinction of starlight in the atmosphere is discussed. An error of approximately 1/2 km in the satellite position measurement is anticipated due to unpredictable variations of atmospheric density. Finally the interference due to the brightness of earth's atmosphere is discussed. (Author)

Division 20 - NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY
Division 21 - NUCLEAR PROPULSION

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-291 212 Div. 20
(TISTP/FR) OTS price $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
COMPUTER-AIDED ANALYSIS OF GAMMA-RAY SPECTROMETER DATA,
by P. A. Read and F. M. Tomnovec. 26 Oct 62, 22p. incl. illus. tables, 3 refs. (Rept. no. NRDL-TR-592)
Unclassified report

DESCRIPTORS: *Gamma ray spectra, *Statistical analysis, Digital computers, Punched card methods.

Gamma ray pulse height distributions are analyzed with the aid of a computer. The method is based on a library of standard distributions punched on IBM cards. To reduce a pulse height distribution into discrete peaks, appropriate standards are chosen from the library, and adjustment factors are provided so that the computer can fit the standards to the distribution. It removes each fit successively from the distribution and leaves us a record thereof. The removal facilitates subsequent fits. The records comprise a set of reduced distributions from which can be deduced the gamma ray spectrum of the source which gave rise to the original distribution. (Author)

AD-291 448 Div. 20
(TISTB/DGH) OTS price $6.60

Institute of Engineering Research, U. of Calif., Berkeley.
THE APPLICATION OF EQUIVALENT RESIDUAL DOSE CONCEPT TO OPERATIONAL PLANNING TECHNIQUES,
by Myron B. Hawkins. 10 Oct 62, 60p. incl. illus. tables, 13 refs. (Rept. no. CDRP-182-106)
(Contract CD-SR-58-40)
Unclassified report

DESCRIPTORS: *Radiological dosage, *Radiation effects, *Shelters, Man, Radiation hazards, Operations, Specifications, Tables, Adsorption, Mathematical prediction, Radioactive fallout.

The equivalent residual dose concept proposed by the National Committee on Radiation Protection permits a more reliable prediction of the medical effects of nuclear radiation exposure during emergency conditions. This study investigates the use of this dose concept during the complex operational situations in the postattack period of a nuclear war. Preliminary planning aids have been developed to permit prediction of the maximum equivalent residual dose encountered in operational regimens involving three phases of radiation protection. Other parameters that can be varied are stay-times in each phase, the permissible dose, and the fallout radiation intensity level. The basic computer program can incorporate a much wider variety of parameters including daily changes in equivalent protection factor, variation in first day radiation exposure, decay rate, etc. The planning aids have been applied to a partial evaluation of standard fallout shelter specifications and the requirements for secondary shelter. The latter study indicates that the use of secondary shelters having a protection factor of about 10 and which could serve as temporary living and working areas would permit significant reductions in primary shelter stay-times. (Author)

AD-291 495 Div. 20
(TISTP/FR) OTS price $1.60

Institute of Engineering Research, U. of Calif., Berkeley.
A COMPARISON BETWEEN ANDERSON'S DYNAMIC MODEL OF FALLOUT AND OTHER MODELS,
by D. C. Kleinecke. 30 Oct 62, 9p. illus. 2 refs. (Rept. no. CDRP-182-112)
(Contract CD-SR-58-40)
Unclassified report

DESCRIPTORS: *Radioactive fallout, *Particles, *Statistical analysis, Nuclear explosions, Particle trajectories.

A. D. Anderson has presented a dynamic model of fallout in which particles are traced from zero time to time of deposit, with the implication that it has little correspondence to the usual models based on a stabilized cloud. It is shown in this report that a close analog to a stable cloud occurs in the dynamic model when it is used for large detonations, sufficient to justify the operational conclusion that the dynamic model can be replaced by an equivalent stable cloud model. The dynamic model is, however, potentially useful as a model for stem formation and studies of wind distortion of the stable cloud. (Author)

AD-291 744 Div. 20
(TISTP/TL) OTS price $2.60

Basel U. (Switzerland).
ABSORPTION SPECTRUM OF THE NO MOLECULE III. THE HETEROGENEOUS PERTURBATION H2 SIGMA + - H'2 PI,
by E. Miescher and K. P. Huber. Sep 62, 9p. illus. tables, 9 refs.
(Grant AF-EOARDC 61-19)
(AFCRL 62-1118) Unclassified report

DESCRIPTORS: *Nitrogen, *Oxygen, *Molecules, *Absorption, *Quantum mechanics, *Isotopes, Perturbation theory, Nuclear spins, Infrared spectroscopy, Nuclei, Electron transitions, Gas ionization, Tables.

A rotational analysis is presented for 2 complex bands H, H' - X observed in the NO absorption spectrum. (0,0) band at 1595 angstroms; (1,0) band at 1538 angstroms. The upper states are H2 sigma + and H'2 pi, two nearly coinciding Rydberg-states interacting with each other in a hitherto unobserved mode. A deperturbation is carried out, and for the first time a consistent interpretation can be given of all known Rydberg-states belonging to the first ionization limit of the NO molecule. (Author)

21. NUCLEAR PROPULSION

No Entries

22. ORDNANCE

AD-291 211 Div. 22, 30
(TISTM/EJH) OTS price $2.60

Naval Ordnance Test Station, China Lake, Calif.
INVESTIGATION OF EXPLOSIVES SENSITIVITY TO MULTIPLE-FRAGMENT IMPACT TRACK TESTS (E-7101),
by L. M. Patton. Dec 62, 26p. incl. illus. tables (Rept. no. NOTS TP 3090)
(NAVWEPS rept. no. 8073)
Unclassified report

DESCRIPTORS: *Explosives, *Detonation, *Impact shock, Storage, Sensitivity, Fragmentation, Explosions, Propagation, Structures, Test methods.

As part of the ASESB program for determining the effectiveness of substantial dividing walls in preventing the propagation of explosions, multifragment impact tests were conducted on the NOTS K-2 track. These tests employed a rocket-powered sled to throw a collection of concrete fragments at an explosive 'acceptor' charge. In four of eight test rounds the acceptor detonated high order when struck by the fragment sample. The fragment velocities chosen for investigation corresponded to those which occurred during the destruction by explosion of full-scale walls. The results prove that wall fragment impact can cause propagation. (Author)

AD-291 494 Div. 22
(TISTB/DGH) OTS price $1.60

Army Engineer Waterways Experiment Station, Vicksburg, Miss.
CRATERS FORMED BY SMALL EXPLOSIONS IN DRY SAND.
Sep 62, 9p. incl. illus. table (Miscellaneous paper no. 2-524)
Unclassified report

DESCRIPTORS: *Cratering, Blast, Data, Tables, Sand.

Cratering shots were fired over, on, and within a 10 x 10 x 2 1/2 ft. sand pit. The test charges which weighed 4 lb each were formed from four 1-lb TNT demolition blocks. Data on average apparent crater dimension are tabulated. Plotted data are presented on (1) reduced diameter and depth versus reduced charge position, and (2) reduced area and volume versus reduced charge position.

AD-291 558 Div. 22
(TISTW/VB) OTS price $3.60

American Machine and Foundry Co., Stamford, Conn.
105 MM HOWITZER XM 102.
Progress rept. no. 1, 26 Oct-30 Nov 62,
by A. Bonanno. 10 Dec 62, 30p. incl. illus. tables.
(Contract DA 11-070-AMC-13)
Unclassified report

DESCRIPTORS: *Howitzers, *Self-propelled guns, *Auxiliary power plants, Propulsion, Transmissions, Feasibility studies, Internal combustion engines, Mechanical drives.

AD-291 568 Div. 22, 14, 17, 30
(TISTM/EJH) OTS price $2.60

German-French Research Inst., Saint-Louis (France).
FLASH RADIOGRAPHIC MEASUREMENT OF THE SHOCK COMPRESSIBILITY OF MAGNESIUM ALLOY, LUCITE, AND POLYETHYLENE,
by R. Schall and G. Thomer. Oct 62, 24p. incl. illus. table, 11 refs.
(Proj. 5776)
(AFSWC TDR 62-134) Unclassified report

DESCRIPTORS: *Plastics, *Magnesium alloys, *Ballistics, *Impact shock, *Flash radiography, Absorption, Shock waves, Density, Blast, Test methods, X rays, Stresses, Shock resistance.

Compressibilities of magnesium alloy, Lucite, and polyethylene were measured during explosively induced shock, using a flash X-ray technique. Measurements on magnesium alloy confirm earlier results from a similar experiment using small explosive charges, but show a distinctly lower compressibility than reported by other authors using free surface measurements. To a lesser extent the Lucite data show the same discrepancy. Polyethylene turns out to be less compressible than Lucite under intense shock loads. (Author)

AD-291 578 Div. 22, 30, 26, 17
(TISTW/PCR) OTS price $1.60

Pitman-Dunn Labs. Group, Frankford Arsenal, Philadelphia, Pa.
AN EXPLOSIVE-OPERATED VALVE,
by Warren E. Fogg. Aug 62, 17p. incl. illus.
(Memo. rept. no. M63-12-1)
Unclassified report

DESCRIPTORS: *Valves, *Cut-off valves, Explosives, Aluminum, Tests, Test methods, Aluminum tubing, Explosive forming.

The object of this investigation was to develop a method for rapidly stopping the flow of gas through a tube and permanently sealing the tube against further leakage. A valve has been developed which will close an aluminum tube (0.5 in. OD by 0.065 in. wall) in approximately 25 microseconds, giving a hermetic seal thereof. The closure is obtained by radially collapsing the tube wall under an explosive load. The rapidly moving walls meet and join to form a bond similar to a weld. Provisions are made to muffle and/or direct the blast so that two or more valves can be operated within inches of each other. Eight of these valves were used successfully as part of an experiment in conjunction with Project Gnome, an underground atomic explosion, at Carlsbad, N. M., on 10 December 1961. (Author)

AD-291 605 Div. 22, 32, 18
(TISTW/PCR) OTS price $2.60

RAND Corp., Santa Monica, Calif.
THE COST OF ADVANCED WEAPONS,
by David Novick. Feb 62, 22p. incl. illus.
(Rept. no. P-2556)
Unclassified report

DESCRIPTORS: *Costs, *Weapons, Analysis, Research program administration, Tests, Production, Operation, Wages, Materials, Electronic equipment.

A generalized discussion of the cost of advanced weapons is presented. Cost factors, such as those incurred in research, development, test, evaluation, production, wages and material prices are considered.

AD-291 701 Div. 22
(TISTP/TL) OTS price $3.60

Rocket Research Lab., Ohio State U., Columbus.
EXPLOSION LIMIT STUDIES OF NITROUS OXIDE AND NI-

TROUS OXIDE-NITROGEN-AIR MIXTURES TO 200 ATM AND 1800 R.
Report on Aerospace Simulation Techniques Research,
by Juris O. Krisjansons, Loren E. Bollinger and Rudolph Edse. Sep 62, 32p. incl. illus. 4 refs.
(Contract AF 33(616)5615, Proj. 7065)
(ARL 62-431) Unclassified report

DESCRIPTORS: *Explosions, *Nitrogen compounds, *Oxides, *Air, Oxygen, Copper wire, Glow discharge, Platinum, Wire, Simulation, Direct current, Alternating current, Pressure, Temperature, Transducers, Oscilloscopes, Schlieren photography.

Explosion limits have been determined in a 117.5 cc cylindrical reaction chamber for pure nitrous oxide and mixtures consisting of N2O + 0.25 AIR, N2O + 0.88N2 and N2O + 0.88N2 + 0.50 AIR. Two types of ignitors were employed; a 0.005-inch copper wire was melted by applying 31 volts dc to its terminals and a 0.020-inch diameter platinum glow wire was heated with approximately 210 watts ac. Results of these experiments are presented in the form of pressure-temperature explosion limit diagrams. The explosion limit curve for nitrous oxide follows an exponential path for both ignitors. Explosions could not be produced in the N2O + 0.25 AIR mixture. However, slow reactions were observed between 593 and 887 K. These results follow a characteristic pattern as shown in the pressure-temperature diagram. No reactions could be initiated in the N2O + 0.88N2 and N2O + 0.88N2 + 0.50 AIR mixtures. Pressure-time relationships of the reactions in pure nitrous oxide and in the N2O + 0.25 AIR mixture were obtained by using a quartz crystal, high-frequency response pressure transducer together with an appropriate oscilloscope and camera. These pressure traces aided in studying the individual reactions more closely and in determining their reaction times. (Author)

AD-291 753 Div. 22, 30, 15
(TISTW/PCR) OTS price $1.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
A DYNAMIC PROGRAMMING SOLUTION FOR A COMBINATORIAL PROBLEM INVOLVING THE SELECTION OF A SET OF OPTIMUM WEAPON YIELDS,
by William Sacco. Oct 62, 23p. incl. tables, 2 refs. (BRL memo. rept. no. 1436)
(DA Projs. 503-05-005 and 503-06-002)
Unclassified report

DESCRIPTORS: *Weapons, Programming, Equations, Numerical analysis, Mathematical analysis, Selection.

A combinatorial problem of current interest to the Weapon Systems Laboratory, BRL, involves a determination of optimal weapon yields. Previously solutions were obtained on BRLESC by exhaustive search techniques. Problems which admit large numbers of possible solutions prove to be time consuming and in some cases practically impossible. The problem is reformulated using the functional equation approach of dynamic programming. A computational algorithm is given which results in significant reductions in the computing times required to obtain solutions. One solution, which had required more than seven hours computing time on BRLESC using the exhaustive search technique, was obtained in less than one second by means of the new method. Many other cases of interest for which results were not attainable using the previous algorithm can now be resolved in a routine manner. (Author)

AD-291 769 Div. 22
(TISTW/PCR) OTS price $1.60

Pitman-Dunn Labs. Group, Frankford Arsenal, Philadelphia, Pa.
DEVELOPMENT OF RELEASE BOLT, NONFRAGMENTATION,
by R. C. Sutter. June 62, 18p. incl. illus.
(Rept. no. R-1645)
(DA Proj. 5S02-06-001)
Unclassified report

DESCRIPTORS: *Explosive bolts, Fragmentation, Shear stresses, Tests, Test methods, Design.

When fired, explosive bolts currently present the danger of flying fragments from the bolt. A project was initiated to develop a nonfragmentation bolt to replace the common explosive bolt. Specifications for the explosive bolt on the clamp ring of Project Mercury were used as a guide. The design selected for development was one that utilized two shear pins as retention members on the bolt. By changing the materials and hardness of these pins, release bolts of many different strengths could be developed. The basic design utilized T14E2 ignition elements as the source of propellent gas for separation of the bolt. The release bolt developed (Design C) offers the prime advantage of separating without external fragmentation. This design is flexible and can be applied to standard cap screw designs. It can be used in place of most existing types of explosive bolts. Further, the electric ignition element can be modified to incorporate necessary additional propellant charge to reduce the complexity of the design as it now stands. (Author)

AD-291 867 Div. 22, 12
(TISTW/PCR) OTS price $1.10

Magnavox Co., Urbana, Ill.
SOLID-STATE ARM SAFE DEVICE.
Monthly progress rept. no. 10, 1 Oct-1 Nov 62,
by L. W. Ricketts. 1 Nov 62, 3p. incl. illus.
(Contract DA 11-022-ORD-4048)
Unclassified report

DESCRIPTORS: *Arming devices, *Safety devices, Electronic equipment, Army, Solid state physics, Switching circuits, Guided missile warheads, Tests, Acceleration, Temperature, Vibration, Shock, Humidity, Guided missiles.

The purpose of this program is to design, develop, and fabricate ten electronic solid state arm safe devices capable of functioning in various warheads for Army missiles under a wide range of environmental conditions. The output is to have a solid state switching circuit which will provide an electrical change of state after the missile has traveled a preselected distance from the launch site. Two units will be made available for telemetering. (Author)

23. PERSONNEL AND TRAINING

AD-291 468 Div. 23, 5
(TISTW/DLW) OTS price $12.50

RCA Defense Electronic Products, Burlington, Mass.
INVESTIGATION OF 360-DEGREE NONPROGRAMMED VISUAL PRESENTATION,

by Burton R. Clay, Marshall C. Kidd and others.
5 June 62, 164p. incl. illus. tables, refs.
(Contract N61339-1053)
(NAVTRADEVCEN 1053-1) Unclassified report

DESCRIPTORS: *Television display systems, *Training devices, *Flight simulators, *Gunnery trainers, Television, Training planes, Optical images, Simulation, Visual perception, Effectiveness.

A study was made to determine whether recent advances in electronics, optics, and data recording could be utilized, in judicious combination, to produce a 360-degree closed circuit panoramic television system that could be used to simulate the external visual environment in vehicle operator training devices. A three-dimensional scale model of the desired operating area provides the visual input information to a closed-circuit multi-channel television system. The television pickup moves over the model in response to the computer-processed control actions of the trainee. The television system acquires full 360-degree panoramic image information by virtue of a scan that is optically rotated in azimuth. The video information thus acquired is transmitted to the display system mounted directly above the student. The projection system produces a real image on the focal surface on an ellipsoidal mirror that surrounds the observer. The scene that he sees is thus made to appear at infinity. The study resulted in a survey of potentially applicable components, systems and techniques, selection of the most useful, and the qualitative design of two system configurations. (Author)

AD-291 627 Div. 23
(TISTB/DGH) OTS price $1.60

Naval Research Lab., Washington, D. C.
AN EQUALIZATION TEACHING MACHINE,
by P. N. Ziegler, H. P. Birmingham, and R. Chernikoff. 20 Nov 62, 9p. incl. illus. 2 refs. (NRL rept. no. 5855)
(Proj. NR 006-09-41-5351)
Unclassified report

DESCRIPTORS: *Teaching machines, *Training, *Personnel, Design, Aviation personnel, Submarine personnel, Control systems, Submarines, Airplanes, Helicopters, Spaceships, Human engineering, Tracking, Selection.

The design and operation of a teaching machine is described for use in the selection and training of operators of higher order vehicle systems. In order to control such vehicles, the operator must compensate for the time lags that are characteristic of higher order systems. This compensation process has been termed ''equalization.'' The device consists of a third-order, two-coordinate tracking system with a servo mechanism for adjusting the values of the quickening gains. Varying the amount of quickening in the system changes the equalization requirements of the tracking task. A naive operator is initially presented with a quickened task needing little equalization. As long as he maintains a small error, quickening continues to be removed. If, however, the operator begins to make errors greater than a predetermined level, more quickening is added until he can again maintain a small error level. This technique of continuous variation of the amount of quickening as a function of error provides at all times an equalization task which is appropriate for the operator's level of proficiency. (Author)

AD-291 788 Div. 23
(TISTB/LMH) OTS price $2.00

Teaching Machines, Inc., Albuquerque, New Mexico.
A STUDY IN THE APPLICATIONS OF TEACHING MACHINES,
by Lloyd E. Homme, Robert E. Willey, and William H. McMahan. 7 Sep 62, 64p. incl. illus. tables, 3 refs.
(Contract N61339-1000)
(NAVTRADEVCEN 1000-1) Unclassified report

DESCRIPTORS: *Teaching machines, *Education, Learning, Achievement tests, Analysis of variance, Intelligence tests, Military requirements, Effectiveness, Programming.

Three experiments were conducted to compare the effects of programmed learning with traditional teaching methods at a naval electronics school. Linear programs were constructed in DC and AC Electricity, and in Calculus for Electronics. Experiment IA compared the results of instruction by television and by programmed learning using a machine and a programmed text in DC Electricity. Experiment IB compared the results of instruction by conventional classroom lecture with the results using a teaching machine and a programmed text in AC Electricity. Final examination grades showed no significant differences between methods of instruction in either experiment. Experiment II compared effects attributed to the method of homework preparation in Calculus. Two groups were used. One group used a regular textbook and the other used a programmed textbook. Examination scores were significantly higher for the group using a programmed textbook. (Author)

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

AD-291 449 Div. 24, 18
(TISTA/GEC) OTS price $3.60

Stockholm U. (Sweden).
APPLICATION OF THE METHOD OF LEAST SQUARES TO THEORETICAL AND PRACTICAL INVESTIGATIONS OF FUNDAMENTAL GEOMETRICAL DATA AND RELATIONS FOR MEASUREMENTS, PRIMARILY TOPOGRAPHIC MAPPING, WITH THE AID OF PHOTOGRAPHS.
Final rept.,
by K. Bertil P. Hallert. Oct 62, 32p. illus. 15 refs.
(Contract DA 91-591-EUC-1927)
Unclassified report

DESCRIPTORS: *Mapping, Aerial photography, Numerical analysis, Least squares method, Topographic cameras, Geometry, Position finding, Errors.

The fundamental operations of photogrammetry have been separately investigated and the geometrical quality of each operation has been determined according to the method of least squares. The method has primarily been used for the distinction between regular and irregular errors of the operations. The regular errors can be corrected for individually but the irregular errors have to be estimated statistically as a standard error of unit weight. The geometrical quality of the regular errors and of the entire procedure is limited by the irregular errors. The standard

errors of arbitrary functions of measured data can be determined with the aid of the laws of error propagation and with attention paid to possible compensating effects between the fundamental operations. The method of least squares has proved to be of great importance because it brings system and order into photogrammetric calculations, gives unique information about the geometrical quality of the observations and their functions, and usually leads to the simplest possible computations. (Author)

AD-291 474 Div. 24
(TISTM/TCG) OTS price $1.10

Army Electronics Research and Development Lab., Fort Monmouth, N. J.
EVALUATION OF EH-33A PHOTOGRAPHIC FILM PROCESSOR,
by Christopher Lucas. July 62, 8p. incl. illus.
(ASRDL Test rept. no. 1485)
Unclassified report

DESCRIPTORS: *Photographic equipment, *Photographic film, *Photographic emulsions, Processing, Viscosity, Solutions, Photographic chemicals, Test methods.

Design features, performance, and test results of the EH-33A photographic film processor are reported. The equipment develops the film by applying a layer of viscous monobath to the emulsion surface. Advantages, disadvantages, and limitations of the processor are discussed. (Author)

AD-291 786 Div. 24, 2
(TISTP/JW) OTS price $5.60

Naval Ordnance Test Station, China Lake, Calif.
SUMMARY OF INVESTIGATIONS OF HEAT-WAVE EFFECTS ON PHOTOGRAPHIC IMAGES,
comp. by Richard B. Walton. Oct 62, 54p. incl. illus. tables, 34 refs. (NOTS TP 2754)
(NAVWEPS rept. no. 7773)
Unclassified report

Original contains color plates; all ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: *Heat, *Optical analysis, *Photographic analysis, Wave characteristics, Ground effect, Instrumentation, Optical images, Tests, Diurnal variations.

A comprehensive report of a year's data, taken from a special range established at NOTS for study of heat wave problems, is presented. The data include micrometeorological information as well as optical and photographic results obtained at frequent time intervals at various distances and from several camera elevations. As a result of multiple correlation analyses of these data three experiments were conducted. Results of these experiments, which demonstrate that it is possible to modify the heat wave problem by application of various ground cover materials, are also presented. (Author)

25. PHYSICS

AD-291 215 Div. 25
(TISTP/WH) OTS price $2.60

Ohio State U. Research Foundation, Columbus.
ELECTRON IMPACT STUDIES OF CARBON DIOXIDE WITH OSCILLATOR STRENGTH DETERMINATIONS,
by Edwin N. Lassettre and Vincent D. Meyer.
Nov 62, 24p. incl. illus. tables, 14 refs.
(Scientific rept. no. 5)
(Contract AF 19(604)4541, Proj. 7635)
(AFCRL 62-1085) Unclassified report

DESCRIPTORS: *Carbon dioxide, *Molecules, *Electrons, *Inelastic scattering, *Oscillation, *Spectrographic analysis, Excitation.

Electron impact spectra of carbon dioxide are reported at accelerating voltages of 150, 200, 300, and 400. Since the resolution of the spectrometer is greater than in previous studies, more detail structure is observed in the spectra. A simple method of determining oscillator strengths in the spectra of molecular gases is presented and several oscillator strengths for carbon dioxide were determined. The results are compared with optical data. (Author)

AD-291 221 Div. 25
(TISTP/JW) OTS price $3.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
GAS DYNAMICS OF HOMOGENEOUS ATOM RECOMBINATION IN A CYLINDRICAL TUBE,
by Terence C. Flaherty, John F. Wilson and Sinclaire M. Scala. Dec 62, 33p. incl. illus. 7 refs. (Rept. no. R62SD97)
Unclassified report

DESCRIPTORS: *Energy, *Gas diffusion, Determination, Kinetic theory, Cylindrical bodies, Argon, Radiation effects, Dynamics, Equations.

The temperature decay in a cylindrical vessel containing a chemically reacting gas is analyzed utilizing the energy equation which is coupled with the chemical kinetic equation of the dissociated gas. It is shown how the net rate of temperature decay is dependent on the simultaneous effects of energy release of the recombining atoms and the heat conducted from the gas into the tube wall. This yields a method of obtaining the recombination rate coefficient from experimental temperature measurements. In this analysis of the decay process, the recombining species is atomic oxygen, and the cylinder is filled with a preponderance of inert argon gas. The results presented apply specifically in the low temperature range ($T < 3000$ degrees R) where the effects of molecular thermal dissociation are negligible; but, the analysis and the derived system of equations apply in a much larger temperature range, limited only by the onset of ionization and radiation processes. (Author)

AD-291 223 Div. 25
(TISTP/JW) OTS price $1.10

Hughes Research Labs., Malibu, Calif.
CESIUM PLASMA STUDIES FOR THERMIONIC ENERGY CONVERSION.
Quarterly letter rept. no. 2, 1 June 61-31 May 62 on Phase 2,
by R. C. Knechtli. 31 May 62, 3p. 2 refs.
(Contract Nonr-350100)
Unclassified report

DESCRIPTORS: *Plasma physics, *Thermionic emission, Energy, Cesium, Ionization, Measurement, Electrons.

AD-291 228 Div. 25, 8
(TISTP/FR) OTS price $2.60

Little, Arthur D., Inc., Cambridge, Mass.
SUPERCONDUCTIVE EFFECTS IN THIN FILMS.
Interim engineering rept. no. 3, 15 July-15 Oct 62,
by S. Shapiro. 15 Nov 62, 21p. incl. illus. 2 refs.
(Contract AF 33(657)7915)
Unclassified report

DESCRIPTORS: *Metal films, *Thin films, *Superconductors, *Detectors, Microwaves, Microwave equipment, Cavity resonators, Waveguides, Aluminum, Tin, Oxides, Feasibility studies.

On the performance of tunneling assemblies as rf detectors at low radio frequencies, effort was concentrated on extending detector operations to microwave frequencies. Samples were prepared involving much smaller tunneling areas than used before. In addition the technique of plasma anodization was used to grow the required oxide layer upon the aluminum films used in the samples. A microwave test setup and associated electronic and cryogenic equipment was assembled and put into operation for the measurements. Detection of a 9570 Mcps microwave signal was observed with the sample exposed either to the maximum rf electric field or to the maximum rf magnetic field. (Author)

AD-291 229 Div. 25
(TISTP/FR) OTS price $1.60

Laboratoire d'Infra Rouge Technique et Applique (France).
STUDY OF THE EDGE EMISSION OF CADMIUM SULPHIDE BOMBARDED BY ELECTRONS.
Final technical rept., 1 Oct 61-30 Sep 62.
30 Sep 62, 9p. illus.
(Contract N62558-2720)
Unclassified report

DESCRIPTORS: *Cadmium compounds, *Sulfides, *Electron bombardment, *Light, Spectrographic analysis, Low temperature research, Liquefied gases, Helium, Nitrogen, Electron guns.

AD-291 402 Div. 25, 26, 8
(TISTE/CAM) OTS price $11.00

Bulova Watch Co., Woodside, N. Y.
PRODUCTION ENGINEERING MEASURE ON TYPE CR-(XM-27)/U CRYSTAL UNITS.
Final rept., Feb 59-July 62,
by A. S. Matistic. July 62, 132p. incl. illus. tables.
(Contract DA 36-039-sc-81271)
Unclassified report

DESCRIPTORS: *Quartz crystals, *Crystals, *Crystal holders, *Manufacturing methods, Production, High frequency, Vibration, Shock, Seals, Processing, Quality control, Test equipment, Test methods, Electrical properties.

Presented is a condensed summary on the production engineering measure to produce crystal units The summary includes a review of the technical problems encountered and an analysis of test results achieved in the pilot run. Included are detailed descriptions and supporting data on dynamic vibration tests, problems encountered in the development of a suitable crystal mount, related crystal processing, yield figures and test resulfs achieved in the pilot run. Material, equipment and operational descriptions are included on all processes employed in the pilot run. The quality control and inspection manual outlines quality control and inspection techniques which were applied to the pilot run. (Author)

AD-291 433 Div. 25, 9
(TISTP/JW) OTS price $9.10

Stanford Research Inst., Menlo Park, Calif.
THE DRAG OF CYLINDERS IN STEADY PARTICLE-LADEN GAS FLOW.
Final rept. on Phase III,
by H. W. Kriebel and E. G. Chilton. Sep 62, 98p. incl. illus. tables, 19 refs.
(Contract DA 49-146-XZ-024)
(DASA-1322) Unclassified report

DESCRIPTORS: *Subsonic flow, *Gases, Velocity, Density, Viscosity, Particles, Drag, Fluid flow.

Two methods were proposed to correlate data on drag of dusty air flow. Method I is based on perfect gas behavior, assuming the dust to contribute only to the gas density. Method II assumes that the particles and gas follow different paths in the vicinity of the body, and the drag due to the gas and that due to the particles are computed independently. Data are correlated by an inertia parameter, K, which combines particle and object diameters, gas velocity, gas density, gas viscosity, and particle density into a non-dimensional number. Research included measurement of the total drag on cylinders in dusty air flow. These experiments verified the theory that, for values of K less than 1, Method I gives a fairly reliable drag prediction. Method II should be used if K is greater than 1. For relatively large targets of military interest, K is low and drag on the targets can be assumed to rise in direct proportion to the dust-air mixture density. For smaller targets the drag may be as much as two or three times higher than would be predicted by assuming direct proportionality to the mixture density. (Author)

AD-291 435 Div. 25, 9
(TISTP/JW) OTS price $5.60

Stanford Research Inst., Menlo Park, Calif.
DRAG OF CYLINDERS AND SPHERES IN STEADY PARTICLE-LADEN GAS FLOW.
Technical rept. (Final) Part 2, Phase II,
by R. E. Lundberg and E. G. Chilton. Nov 62,
47p. incl. illus. tables, 16 refs.
(Contract DA 49-146-XZ-024)
(DASA-1296) Unclassified report

DESCRIPTORS: *Fluid flow, *Particles, Reynolds number, Digital systems, Motion, Drag, Cylindrical bodies, Spheres, Velocity, Air, Gases.

The drag on cylinders and spheres has been computed for steady particle-laden gas flows in which the particles may follow paths different from the gas stream lines. Particle trajectories and velocities are computed by a digital method which appears to be more accurate than earlier analog methods. With the results of this computation the drag due to momentum transfer between particles and gas is calculated. The total drag on the body is the sum of this momentum transfer drag, the drag due to particles impacting on the body and the clean gas drag computed by conventional means. Calculation procedures are developed for particles of uniform size as well as for varying size particle streams. The pressure distribution over the front face of both

cylinders and spheres is also computed. Results are correlated by the inertia parameter and particle Reynolds number and roughly indicate that for adjusted inertia parameters less than 0.1, particles generally follow the streamlines; and the drag can be computed as if the blast were a clean gas with the density of the mixture. (Author)

AD-291 453 Div. 25
(TISTE/CRJ) OTS price $4.60

Laboratory for Electronics, Inc., Boston, Mass.
RESEARCH IN FERROMAGNETICS.
Scientific rept. no. 1, 15 Mar-15 Dec 61.
15 Dec 61, 37p. incl. illus. table (Rept. no. 979-A1; TP-311)
(Contract AF 19(604)8349, Proj. 5632; Continuation of Contract AF 19(604)5233)
(AFCRL 62-922) Unclassified report

DESCRIPTORS: *Ferromagnetic materials, *Thin films, Surfaces, Nucleation, Preparation, Magnetic coatings, Mathematical analysis, Nickel, Cobalt, Ferrites.

Experiments are described showing magnetostatic interaction between thin magnetic films on separate superimposed substrates. A film edge, a scratch imperfection, and a broad butting-magnetization wall show the ability to influence domain nucleation in a second film. Further experiments are described for interactions between double thin-film structures on the same substrate. The ability is demonstrated of a simple 180 degree wall in one film to cause nucleation of a long slender domain in the neighboring film with the application of an applied field. The nucleation of a domain in one film by a simple Neel or Block wall in another film is studied theoretically. Conditions for domain nucleation are derived. Experiments are described showing the effect on wall motion in one film of the presence of (stationary) walls in a second film. The magnitude of the experimental interaction is compared with theoretical predictions derived earlier. Explanations are advanced for the smallness of the experimental interaction, and means for achieving interactions closer to theoretical predictions are discussed. A nondestructive read memory element is advanced that depends on the effect of wall interaction on the coercive force of a film. The expected interaction between a wall in one film and an edge of a second film is calculated assuming a linear dipolar wall model and a film edge with a finite width of uniformly-distributed charge. (Author)

AD-291 454 Div. 25, 8, 15
(TISTP/JW) OTS price $3.60

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
THE MULTIPLE-CROSSED-BEAM METHOD FOR MEASURING ELECTRON-IONIZATION CROSS SECTIONS,
by C. K. Crawford and C. E. Woodward. Nov. 62, 36p. incl. illus. (Technical rept. no. 175)
(Contracts AF 33(616)8353 and Nonr-184110, Proj. NR 018-801)
Unclassified report

DESCRIPTORS: *Ionization, *Electron beams, Measurement, Signal-to-noise ratio, Spectrographic analysis, Fluid flow, Gases, Atmospherics, Energy, Velocity, Instrumentation, Design.

A new method for measuring the absolute values of electron-ionization cross sections is proposed. The technique involves intersecting two electron beams with a single atomic beam composed of the material to be studied. Pulsing the first electron beam results in an atomic-beam modulation which may be detected by the second electron beam. Ionization cross sections may be determined if the resulting ion currents are measured and the intersection geometries known. The absolute material-flow rate may also be determined. If a mass spectrometer is provided, the technique may be used on atomic beams composed of several constituents. The absolute cross-section values and the flow rates may be calculated separately for each constituent. The preionization mass and the source temperature can also be calculated. The theory for the method has been developed, and suitable experimental apparatus built. The technique was demonstrated using magnesium. In its present form the signal-to-noise ratio is poor, about 2:1, but suggestions are made which would improve it by more than two orders of magnitude. More work is required before useful cross-section data can be obtained. (Author)

AD-291 460 Div. 25
(TISTP/JW) OTS price $6.60

Tufts U., Medford, Mass.
SPECTROSCOPIC INVESTIGATIONS OF SOLID STATE SURFACES CONTAINING ADSORBED MOLECULES.
Final rept.,
by M. Kent Wilson. 31 May 62, 63p. incl. illus. tables, refs.
(Contract AF 19(604)4063, Proj. 5620)
(AFCRL 62-585) Unclassified report

DESCRIPTORS: *Infrared spectroscopy, *Solid state physics, Germanium compounds, Adsorption, Silicon compounds, Frequency, Vibration, Surfaces, Molecules, Oxides.

A wide range of work in infrared spectroscopy is summarized. Several cells suitable for observing the infrared spectra of molecules adsorbed on solid surfaces are described. Preliminary experiments with a Germanium oxide gel gave promise of producing a very useful substrate for future spectroscopic work. Several unsuccessful attempts were made to produce finely divided germanium suitable for adsorption studies. The last sections of the report contain several papers dealing with normal coordinate analyses of simple molecules containing germanium or silicon as the central atom. Some understanding of the effect of surroundings on the vibrational frequencies of groups involving germanium and silicon was achieved. (Author)

AD-291 461 Div. 25, 20
(TISTP/JW) OTS price $8.60

SKF Industries, Inc., Philadelphia, Pa.
INFLUENCE OF LUBRICATION ON ENDURANCE OF ROLLING CONTACTS.
Special rept. on X-Rays Passing Between Two Identical Spheres,
by Ronald L. Huston. 9 Nov 62, 96p. incl. illus. tables (Rept. no. AL62L020)
(Contract NOw-61-0716-c)
Unclassified report

DESCRIPTORS: *X-ray diffraction analysis, *Spheres, Radiation effects, Reflection, Mathematical analysis, Geometry, Calibration, Linear systems, Films, Metals.

A mathematical investigation of the radiant X-Ray energy passing between metallic spheres is presented with the primary emphasis placed upon configurations of significant practical interest. The analysis is essentially divided between two parts which pertain to the direct

and reflected radiation, and results are obtained which relate to each part as well as the total, combined radiation. The results provide a relationship between the radiant X-Ray energy and the separation between the metallic spheres. Graphical and tabular results are given for a specific geometric configuration. Geometric and algebraic approximations are used in order to simplify the analysis. Also, physical assumptions are made regarding X-Ray reflection. A complete account of the approximations is maintained and an estimate of the error is available for all expressions throughout the analysis. (Author)

AD-291 502 Div. 25
(TISTM/BRW) OTS price $2.60

Institute of Engineering Research, U. of Calif., Berkeley.
ON THE MECHANICAL BEHAVIOR OF VISCOELASTIC/PLASTIC SOLIDS,
by P. M. Naghdi and S. A. Murch. Oct 62, 24p. incl. illus. 12 refs. (Series no. 175, Issue no. 1; Technical rept. no. 1)
(Contract Nonr-22281, Proj. NR 064-499)
Unclassified report

DESCRIPTORS: *Solids, Elasticity, Viscosity, Plasticity, Theory, Deformation, Creep, Stresses, Applied mechanics, Loading, Tensor analysis, Mechanical properties.

This paper is concerned with a theory of viscoelastic/plastic solids which reduces to that of the classical (linear) viscoelasticity as one limiting case and to the (inviscid) theory of elastic/plastic solids in another. Whereas the viscoelastic strain rates are assumed to be derivable from the appropriate creep integral laws of classical viscoelasticity, the plastic strain rates in stress space are dependent not only on the path history but also the time history of stress. After postulating the existence of a regular loading surface in the viscoelastic-plastic state and deducing the appropriate criterion for loading, a major portion of the paper is devoted to establishing (1) the convexity of the loading surface, (2) the direction of the plastic strain rate vector in stress space, and (3) the structure of the constitutive equations for the plastic strain rates. The loading surface of the present theory (in contrast to that of the inviscid theory of plasticity), being dependent on certain measures representing time history of stress, is allowed to continually change its shape; this has implications in the interpretation of experimental results dealing with the determination of the initial and subsequent yield surfaces where corners are observed. (Author)

AD-291 503 Div. 25
(TISTP/WH) OTS price $8.60

Cruft Lab., Harvard U., Cambridge, Mass.
RELAXATION TIME MEASUREMENTS IN RUBY BY A DC MAGNETIZATION TECHNIQUE,
by Shih-yu Feng. 1 June 62, 56p. illus. 32 refs.
(Technical rept. no. 371)
(Contract Nonr-186616, Proj. NR 372 012)
Unclassified report

DESCRIPTORS: *Relaxation time, *Ruby, *Magnetic fields, *Paramagnetic crystals, *Paramagnetic resonance, Cavity resonators, Measurement, Microwaves.

A method of measuring the relaxation time of paramagnetic substances was developed. The change in the z-component of the magnetization was detected by a pick-up coil and the signal was amplified, integrated, and displayed on an oscilloscope. The method was much simpler than any of the other methods, and the reliability of data was, therefore, better. By this technique, the cross-relaxation and the spin-lattice relaxation times were measured for ruby crystals. High-order cross-relaxation processes involving three, four, and five spins were observed, and the relaxation signal could be described fairly well by the solution of a set of rate equations appropriate to the particular process. Spin-lattice relaxation times were measured at different temperatures and concentrations. A Bloembergen-Pershan model, involving an inverted Orbach-Wolf mechanism, could satisfactorily explain the observed data. The dependence on concentration, magnetic field strength was also discussed. A qualitative explanation, due to Orbach, was given and the result was compared with the existing data. It seems that there is a mild field dependence, approximately linear with H, at high magnetic fields. (Author)

AD-291 537 Div. 25, 13
(TISTP/JW) OTS price $8.10

Illinois U., Urbana.
NUCLEAR GEOPLOSICS. A SOURCEBOOK OF UNDERGROUND PHENOMENA AND EFFECTS OF NUCLEAR EXPLOSIONS. PART V. EFFECTS ON UNDERGROUND STRUCTURES AND EQUIPMENT,
by N. M. Newmark and J. L. Merritt. 15 July 62, 159p. incl. illus. tables, refs. (Rept. no. 3203(V) Draft)
(Contracts DA 49-146-xz-027 and DA 49-146-xz-030)
(DASA-1285, pt. 5) Unclassified report

DESCRIPTORS: *Nuclear explosions, *Underground structures, Blast, Construction, Shielding, Design, Shock resistance.

The effects of nuclear explosions on underground structures and equipment located in buried structures are presented. Emphasis of the discussion is on the character of the stress wave and the associated forces which act on structures buried below the surface. A summary and discussion are presented of the theoretical results and empirical data which form the basis for current design procedures. (Author)

AD-291 546 Div. 25
(TISTP/JW) OTS price $7.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DIVISION 8. SOLID STATE RESEARCH.
Nov 62, 61p. incl. illus. tables, refs.
(Rept. no. 3)
(Contract AF 19(628)500)
(AFESD TDR 62-237) Unclassified report

DESCRIPTORS: *Solid state physics, *Transistors, *Materials, Diodes, Alloys, Arsenides, Semiconductors, Oxides, Electrical properties, Telluride, High pressure research, Optics, Superconductors, Crystals, Thermodynamics, Physical properties.

AD-291 561 Div. 25
(TISTM/REB) OTS price $5.60

Purdue Research Foundation, Lafayette, Ind.
SEMICONDUCTOR RESEARCH.
Quarterly rept. (Final); 1 Oct 61-30 Sep 62. 30 Sep 62, 55p. incl. illus. tables, refs.
(Contract DA 36-039-sc-87394)
Unclassified report

Division 25 - PHYSICS

DESCRIPTORS: *Semiconductors, *Gallium compounds, *Indium compounds, *Antimonides, *Germanium, Electrical properties, Optics, Radiation effects, Specific heat, Crystals, Single crystals, Zinc compounds, Tellurides, Intermetallic compounds, Test methods.

In the study of hot carrier phenomena, the method of determining carrier distribution in p-type Ge by using the change of IR absorption under applied electric field appears to have been brought to a successful stage. Galvanomagnetic studies on p-type Ge, InSb, and GaSb yielded interesting results on the magneto-resistance, anisotropy, saturation with magnetic field, etc., adding to the information on the valence band. Preliminary measurements of the piezoresistance of n-type GaAs were made with the aim of determining the structure of the conduction band. In the work on the optical properties of GaSb, exciton absorption and absorption of exciton-impurity complexes were observed and studied with polarized light and with applied magnetic field. Radiation damage in silicon was investigated by studing the microwave paramagnetic resonance and the infrared absorption. Specific heat was studied on indium alloys and lead with empahsis on the superconducting state. The electronic states of the shallow acceptor impurities in Ge were calculated theoretically to improve the previous calculations. Single crystals of Ge, InSb, and GaSb semiconductors were prepared. (Author)

AD-291 591 Div. 25, 20
(TISTP/JW) OTS price $6.60

Stanford Research Inst., Menlo Park, Calif.
ELECTRON COLLISION FREQUENCIES AND SCATTERING CROSS SECTIONS IN THE IONOSPHERE.
Final technical rept. no. 6, pt. A,
by Charles J. Cook and Donald C. Lorents.
15 Aug 61, 54p. incl. illus. 47 refs.
(Contract DA 36-039-sc-85052)
Unclassified report

DESCRIPTORS: *Ionospheric disturbances, *Electron bombardment, Conductivity, Density, Computers, Model tests, Scattering, Velocity, Frequency, Atmosphere, Blast, Perturbation theory.

AD-291 647 Div. 25, 9
(TISTP/JW) OTS price $2.60

California Inst. of Tech., Pasadena.
EFFECTS OF THERMAL CONDUCTION IN SONOLUMINESCENCE,
by Robert Hickling. Nov 62, 26p. incl. illus. tables, refs. (Rept. no. 85-21)
(Contract Nonr-22028)
Unclassified report

DESCRIPTORS: *Thermal conductivity, *Luminescence, Intensity, Temperature, Heat transfer, Cavitation, Gases, Solubility, Numerical analysis.

Current experimental results indicate that sonoluminescence is largely thermal in origin, with the spectra showing a direct relation between luminous intensity and the temperatures generated inside the collapsing cavitation bubbles. The strong dependence of the luminous intensity on the nature of the gas dissolved in the liquid is explained in terms of thermal conduction. Provided the cavitation bubbles are sufficiently small, loss of heat from the bubble into the liquid can significantly reduce the temperatures attained during collapse, so that there is a consequent reduction in the luminous intensity. This process is demonstrated analytically by means of a numerical solution of the equations of motion of a gas inside a collapsing cavitation bubble. The agreement between the theory and the observed luminous intensities for different dissolved gases is good. (Author)

AD-291 648 Div. 25
(TISTM/ODN) OTS price $2.60

Metals Research Lab., Carnegie Inst. of Tech., Pittsburgh, Pa.
NUCLEATION RATES IN THE ALPHA TO BETA TRANSFORMATION OF TIN.
Technical rept.,
by C. G. Durdaller, W. H. Robinson, and G. M. Pound. 1960, 27p. incl. illus. tables, 6 refs.
(Contract Nonr-76008)
Unclassified report

DESCRIPTORS: *Tin, *Transformations, *Nucleation, X ray diffraction analysis, Particles, Thermodynamics, Phase transitions, Metallic crystals.

The nucleation rate of the alpha (gray) to beta (white) tin transformation was measured as a function of temperature and alpha tin particle size by an x-ray diffraction technique. The power specimens of alpha tin were essentially monodisperse and the small dimension of the particles of these specimens was varied from 13 to 75 microns. The fraction isothermally transformed as a function of time was determined continually from integrated intensity measurements of the 220 x-ray reflection of alpha tin. Inasmuch as the period for propagation of the beta phase is negligible in such small particles and since there was not internucleation between particles, it was possible to obtain the nucleation rate directly from the transformation data. Several types of nucleation sites of differing potency were found to be operative in the nucleation process. Analysis of the temperature dependence of rate constants at a given fraction transformed suggests that the active sites are regions of higher free energy and not catalytic interfaces. Appreciable induction periods were observed at the lower temperatures of transformation. They may be described in terms of a theory relating to the effect of decreased atomic mobility in delaying the establishment of a steady-state distribution of embryos. (Author)

AD-291 680 Div. 25
(TISTP/JW) OTS price $13.00

Minnesota U., Minneapolis.
STUDIES OF THE DYNAMIC PROPERTIES OF LANGMUIR PROBES.
Report for 1 Apr 60-1 Apr 62 on Research on Plasma Dynamics,
by H. J. Oskam, R. W. Carlson, and T. Okuda.
Aug 62, 113p. incl. illus. 20 refs.
(Contract AF 33(616)7034, Proj. 7073)
(ARL 62-417) Unclassified report

DESCRIPTORS: *Plasma physics, *Gases, Measurement, Dynamics, Motion, Ions, Shielding, Vacuum systems, Density, Excitation, High frequency.

The dynamic behavior of a Langmuir probe immersed in a gaseous plasma is studied by using various measuring techniques. The delay in the current collection is investigated as a function of probe potential and plasma parameters and a qualitative theory based upon the motion of ions is presented. The capacitance of the probe sheath is calculated and compared with the measured values. In order to eliminate the influence of the stray probe capacitance on the measurements a shielded Langmuir probe was developed. (Author)

AD-291 691 Div. 25, 9
(TISTP/JW) OTS price $2.60

Michigan U., Ann Arbor.
ELASTIC-DIFFERENTIAL CROSS SECTION OF $\pi^+ + p$ AT 1.5, 2.0, AND 2.5 BeV/c,
by Victor Cook, Martin L. Perl and others.
Nov 62, 22p. incl. illus. tables, 14 refs.
(Technical rept. no. 8)
(Contract Nonr-122423)
Unclassified report

DESCRIPTORS: *Elasticity, *Scattering, *Differential equations, Pions, Protons, Motion, Resonance, Energy, Functions, Measurement.

AD-291 702 Div. 25, 9
(TISTP/TL) OTS price $3.60

Rocket Research Lab., Ohio State U., Columbus.
CHEMICAL KINETICS OF NITROUS OXIDE DECOMPOSITION AT ELEVATED PRESSURES AND TEMPERATURES.
Rept on Aerospace Simulation Techniques Research,
by E. Stokes Fishburne and Rudolph Edse.
Sep 62, 31p. incl. illus. tables, 17 refs.
(Contract AF 33(616) 5615, Proj. 7065)
(ARL 62-430) Unclassified report

DESCRIPTORS: *High pressure research, *High temperature research, *Nitrogen compounds, *Oxides, *Decomposition, *Shock tubes, Shock waves, Reflection, Schlieren photography, Vibration, Relaxation time, Valence.

Kinetic studies of the thermal decomposition of nitrous oxide were conducted in the temperature range from 1000 to 2500 K. The decomposition of nitrous oxide behind the reflected shock wave in a shock tube was investigated using photographic techniques. It appears that the rate of decomposition may be governed by the vibrational relaxation time of the lower energy valence bond. Induction times for the rapid decomposition of nitrous oxide range from 152 microseconds at 1430 K to zero microseconds at about 2500 K. The value of about 150 microseconds at 1430 K agrees qualitatively with approximate values obtained by other investigators. (Author)

AD-291 730 Div. 25
(TISTP/JW) OTS price $3.60

Army Signal Missile Support Agency, White Sands Missile Range, N. Mex.
DEVELOPMENT OF SMALL MAGNETIC-OPTIC CONVERTER (MOC, JR.).
Interim rept.,
by C. H. Oppenheim. July 62, 30p. incl. illus. tables (Technical rept. no. EID-125)
(Proj. 3C16-19-001)
Unclassified report

DESCRIPTORS: *Optics, *Magnetic effects, Non-destructive testing, Conversion ratio, Instrumentation, Tests, Digital recording systems.

A small magnetic-optic converter (MOC, Jr.) was developed to visually study digital information on magnetic tape in a convenient and nondestructive manner. A rapid analysis of the magnetic configurations can be performed on either analog or digital instrumentation tape to determine if a tape recorder is functioning properly, if the proper tape format is being used, and to read data or locate certain points of interest on the tape. This report covers the approach and development of the MOC, Jr. to its present configuration and the results of various tests using the magnetic-optic converter. (Author)

AD-291 747 Div. 25, 15
(TISTP/JW) OTS price $1.60

Boeing Scientific Research Labs., Seattle, Wash.
FINITE AMPLITUDE INSTABILITY OF THE POSITIVE COLUMN,
by Oivin Holter. Nov 62, 17p. illus. 9 refs.
(Document no. D1-82-0211)
Unclassified report

Also available from the author.

DESCRIPTORS: *Magnetic fields, *Diffusion, *Amplitude modulation, Stability, Electric currents, Semiconductors, Oscillation.

The theory of Johnson and Jerde for the instability of the positive column was extended to include oscillations of finite amplitudes. The method followed in the approximate solutions of the non-linear equations is the one suggested by Kadomtsev and Nedospasov. The stability condition is expressed in terms of an amplitude factor giving the rate at which the diffusion increases in the presence of the finite amplitude oscillations. The theory developed was combined with the diffusion theory of Lehnert, and the electric field was calculated as a function of tube radius x magnetic field. The results are in good qualitative agreement with the experimental results found by Hoh and Lehnert up to magnetic fields several times higher than the critical field. (Author)

AD-291 749 Div. 25, 17
(TISTM/TCG) OTS price $1.60

Brown U., Providence, R. I.
EXPERIMENTAL STUDY OF THE DYNAMIC MODULUS OF ALUMINUM IN THE PRESENCE OF CREEP,
by S. R. Bodner and C. L. Amba Rao. Nov 62, 9p. illus. 6 refs. (Technical rept. no. 32)
(Contract Nonr-56220, Proj. NR 064-424)
Unclassified report

DESCRIPTORS: *Aluminum, *Beams, Mechanical properties, Creep, Dynamics, Tensile properties, Stresses, Buckling, Vibration, Oscillation.

An experimental study on the interaction of tensile creep and low amplitude lateral oscillations was performed on aluminum specimens to determine the changes in the dynamic modulus due to creep and the effect of vibrations on the creep properties. No significant changes were found to occur in either the dynamic modulus or in the creep characteristics. The dynamic formulation of creep buckling problems is discussed in relation to these results. (Author)

AD-291 752 Div. 25, 8
(TISTP/JW) OTS price $1.60

Cruft Lab., Harvard U., Cambridge, Mass.
SCATTERING BY A NARROW PERFECTLY CONDUCTING INFINITE STRIP IN A GYROTROPIC MEDIUM,
by S. R. Seshadri. 25 Oct 62, 11p. 3 refs.
(Technical rept. no. 380)
(Contract Nonr-186632, Proj. NR 371-016)
Unclassified report

DESCRIPTORS: *Scattering, *Electromagnetic waves, Conductors, Integral equations, Wave characteristics, Plasma physics, Polarization, Magnetic fields.

The scattering of a plane electromagnetic wave of wave-number k by a perfectly conducting infinite strip of width 2a is investigated for the case in which the surrounding medium is gyrotropic. The gyrotropic axis is taken parallel to the edges of the strip. The problem is formulated

in terms of an integral equation whose solution is obtained in the form of a series in powers of ka. Expressions for the far-zone fields and the first two terms in the series for the total scattering cross section are obtained. (Author)

AD-291 773 Div. 25
(TISTP/JW) OTS price $3.00

General Electric Co., Syracuse, N. Y.
STUDY OF ELECTRON FOCUSING BY NON-LINEAR SPIRALS.
Final rept., June 59-Oct 61,
by Kurt Schlesinger. Oct 62, 191p. incl. illus. tables, 38 refs.
(Contract AF 33(616)6593, Proj. 4156)
(ASD TDR 62-163) Unclassified report

DESCRIPTORS: *Cathode ray tubes, *Optical systems, Resistance, Stability, Electrons, Focusing, Density, Linear systems, Coatings.

The use of resistive spiral coatings in electron optical devices is discussed. These include spirals with uniform, as well as non-uniform, turn density. The linear spirals control electron optical throw without focusing. Non-linear spirals can be used as electron lenses of the converging, as well as diverging, type. A general theory called electron trigonometry is developed to predict image formation in systems with spiral optics. This theory is also applicable to conventional systems employing electrostatic, magnetic, or mixed fields. Practical applications of spiral optics are illustrated by four types of developmental cathode ray tubes, including: Scan stabilizer tube, conserving sweep size over a wide range of post acceleration; penetron tube, using spiral optics for a single beam two color display; scan magnifier, using a spiral lens to increase picture size up to three times linear; and microspot tube, using a spiral neck to produce 3,000 lines per inch at 40KW per sq. cm. (Author)

AD-291 776 Div. 25
(TISTM/EJH) OTS price $1.60

Institute for the Study of Metals, U. of Chicago, Ill.
THE MAGNETIC SUSCEPTIBILITY OF MnF2,
by Charles Trapp and J. W. Stout. 1962, 9p. incl. illus. 23 refs. (Technical rept. no. 9)
(Contract Nonr-212113)
Unclassified report

DESCRIPTORS: *Ferromagnetic materials, *Ferromagnetism, *Antiferromagnetism, *Manganese compounds, *Fluorides, Single crystals, Magnetic susceptibility, Lattices, Spin, Paramagnetic resonance, Theory, Temperature.

AD-291 779 Div. 25
(TISTP/JW) OTS price $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
SCATTERING FROM DENSITY FLUCTUATIONS IN A PLASMA (SCATTERING AND ABSORPTION CROSS SECTION),
by M. S. Macrakis. 22 Oct 62, 15p. incl. illus. 8 refs. (Technical rept. no. 284)
(Contract AF 19(628)500)
(AFESD TDR 62-249) Unclassified report

DESCRIPTORS: *Plasma physics, *Electromagnetic waves, Density, Spectrographic analysis, Scattering, Plasma oscillations, Dielectric properties, Refraction, Absorption.

Recent interest in scattering of a coherent electromagnetic wave from density fluctuations in a plasma centers on the examination of the scattering cross section and its relation to the fluctuation spectrum of the plasma. This report generalizes the formulation of the scattering problem to show that the absorption cross section must be considered in addition to the scattering cross section. The formulation of the problem follows two different but equivalent methods. One method depends on the connection between the scattering cross section and the imaginary part of the index of refraction. The second method depends on the use of Boltzmann's equation for the description of a plasma in terms of a dielectric with spatial dispersion and external (free) charges and currents. The work indicates that a correct description of the problem requires the use of the space and time-dispersive dielectric coefficients epsilon trans (k omega) and epsilon trans (k omega). In addition to the transverse scattering cross section, the cross section is derived for scattering of a coherent longitudinal density wave from density fluctuations. (Author)

AD-291 782 Div. 25, 9
(TISTP/JW) OTS price $5.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
THEORY AND DESIGN OF A SUBSONIC SPECTRUM ANALYZER,
by Theodore Bially. 26 Apr 62, 44p. incl. illus. 6 refs. (Scientific rept. no. 1, Research rept. no. PIBMRI-1013-62)
(Contract AF 19(628)375, Proj. 4691)
(AFCRL 62-368) Unclassified report

DESCRIPTORS: *Spectrographic analysis, *Memory devices, Low frequency, Instrumentation, Frequency analyzers, Signals, Subsonic flow.

The coherent memory filter is analyzed in its application as a spectrum analyzing device and is shown to be capable of performing a spectrum analysis with a minimum of mean squared error in a minimum of time. The instrument herein described will provide a visual display of the low frequency spectral components of any arbitrary waveform which is applied to its input terminals. In particular, it will analyze frequencies up to four cycles per second with a resolution, or uncertainty, of better than sixty seven thousandths of a cycle. The signal must be available for analysis for a period of time of not less than fifteen seconds. Theoretical and practical considerations in the instrumentation of the device are discussed from the system design viewpoint. (Author)

AD-291 783 Div. 25
(TISTP/JW) OTS price $8.10

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
THERMODYNAMIC CONSIDERATIONS FOR MHD SPACE POWER SYSTEMS,
by Steven I, Freedman. Sep 62, 90p. incl. illus. 19 refs. (Rept. no. R62SD83)
(Contract Nonr-386700)
Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, *Thermodynamics, Gases, Power plants, Generators, Radiators, Shielding, Pressure, Boiling, Refrigeration systems.

Thermodynamic efficiencies and radiator sizes of Brayton Cycle MHD generator systems, with and without regenerators, were obtained. A new gas cycle, the Tri-Cycle, was synthesized. The Tri-Cycle has a radiator size as small as the regenerative Brayton Cycle, but a high pressure ratio. A new cycle was discovered which operates on a dissociating chemical reaction and combines

the advantages of a dry gas expansion, a liquid compression, and a Rankine Cycle size radiator. Entropy generation in supersonic MHD generators was analyzed, the polytropic efficiency was related to the generator operating parameters. Transient boil-off and refrigeration techniques were examined. Multiple radiation shield insulation thicknesses were computed. An optimum temperature ratio for heat rejection from an active refrigeration system was found for superconducting magnets. (Author)

AD-291 791 Div. 25, 30
(TISTM/EJH) OTS price $2.60

Navy Electronics Lab., San Diego, Calif.
ELASTIC CONSTANTS OF MAGNESIUM SILICIDE AND MAGNESIUM GERMANIDE.
Research and development rept.,
by R. D. Redin. 17 Sep 62, 20p. incl. illus. tables, 11 refs. (NEL rept. no. 1133)
Unclassified report

DESCRIPTORS: *Magnesium compounds, *Germanium compounds, *Silicides, *Sound transmission, *Elasticity, Intermetallic compounds, Semiconductors, Single crystals, Measurement, Ultrasonics, Oscilloscopes, Crystal oscillators.

Adiabatic elastic constants of the semiconducting intermetallic compounds magnesium silicide and magnesium germanide were determined at room temperature. Computations were made from measured velocities of propagation of 7.5 Mc/s ultrasonic pulses. In units of 10 to the 11th power dynes per sq. cm the constants are for magnesium germanide, C sub 11 = 10.43, C sub 12= 1.41, and C sub 44 = 4.30; for magnesium silicide they are C sub 11 = 10.46, C sub 12 = 1.67, and C sub 44 = 4.25. (Author)

AD-291 795 Div. 25, 17
(TISTM/TCG) OTS price $.75

New York U., N. Y.
CORRELATION OF PLATE CREEP BUCKLING THEORY WITH EXPERIMENTS ON LONG PLATES OF ALUMINUM ALLOY 2024-0 AT 500 F.
Final rept., Feb-Aug 62 on Metallic Materials,
by Ralph Papirno and George Gerard. Sep 62, 31p. incl. illus. 7 refs.
(Contract AF 33(657)8233, Proj. 7351)
(ASD TDR 62-865) Unclassified report

DESCRIPTORS: *Aluminum alloys, *Creep, *Buckling, Sheets, Theory, Instrumentation, Loading, Stresses, Deformation, Solid state physics, Mechanical properties.

The results of creep buckling experiments on long, simply supported plates of Al alloy 2024-0 at 500 F under axial compression were correlated with a previously developed theory for perfect plates. Compressive creep properties of the test material were obtained to develop the theoretical results. The plate experiments were performed using a square tube configuration after an evaluation program indicated that the conventional vee groove-knife edge arrangement for simulating simple support was unsatisfactory for use at elevated temperatures. The theory was found to have predictive value for plate creep buckling when used in normalized form. A simplified approach for predicting creep crippling was also correlated with the test data. (Author)

AD-291 797 Div. 25, 30, 9
(TISTP/JW) OTS price $3.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
THE DEVELOPMENT OF AN ELECTRICALLY HEATED SHOCK DRIVEN TEST FACILITY. SECOND SYMPOSIUM ON HYPERVELOCITY TECHNIQUES SPONSORED BY THE UNIVERSITY OF DENVER 20-21 MARCH 1962, DENVER, COLORADO,
by W. R. Warren, D. A. Rogers, and C. J. Harris. 1962, 38p. incl. illus. 28 refs.
(Contract AF 04(647)617)
Unclassified report

DESCRIPTORS: *Shock tubes, *Re-entry aerodynamics, Symposia, Gases, Mach numbers, High temperature research, Test facilities, Hypervelocity vehicles, Helium.

Progress in the development and evaluation of an electrically heated helium shock driven facility is described. The work covered is concerned primarily with a small prototype shock tube. While this tube does not completely meet the requirements one would establish for an ultimate test facility, results from its study do indicate that the attractive features of high performance shock tubes discussed earlier can be achieved. One interesting result of this work is that the prototype facility itself has been found to be useful in the study of hypervelocity stagnation region convective heat transfer problems. (Author)

AD-291 821 Div. 25
(TISTP/JW) OTS price $3.60

University of Southern Calif. Engineering Center, Los Angeles.
EXCITATION OF WAVES IN A WARM PLASMA BY AN ELECTRIC DIPOLE.
Technical rept.,
by Hans H. Kuehl. Sep 62, 28p. 12 refs.
(USCEC rept. no. 82-205; EE-15)
(Contract AF 19(604)6195, Proj. 4642)
(AFCRL 62-737) Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Plasma oscillations, Hydrodynamics, Thermal radiation, Plasma physics, Perturbation theory, Ionization, Dipole moments, Excitation.

The general expression for the monochromatic electromagnetic field due to an electric dipole immersed in an unbounded, homogeneous, warm, collisionless plasma in the absence of a magnetostatic field is derived. A hydrodynamic description is used and the limitations of this approach as applied to the problem are considered. It is found that the field is generally composed of three parts which, in the radiation region, correspond to the well-known transverse, longitudinal electron, and longitudinal ion waves. The power flow in the radiation region is shown to be largest along the axis of the dipole for low frequencies whereas the maximum occurs perpendicular to the dipole at high frequencies. (Author)

AD-291 837 Div. 25, 4
(TISTM/REB) OTS price $1.60

North Carolina U., Chapel Hill.
DISLOCATION-IMPURITY INTERACTIONS AND STRAIN AGING IN AgCl,
by M. N. Kabler, M. G. Miller, and L. M. Slifkin. 1962, 13p. incl. illus. 20 refs.
(Contract AF 49(638)865)
Unclassified report

DESCRIPTORS: *Silver compounds, *Chlorides, *Crystals, Chemical impurities, Aging, Stresses, Reaction kinetics.

Strain aging has been observed around room temperature in silver chloride single crystals containing a few parts in 100,000 impurity.

On the basis of the aging kinetics, it is possible to account for the effects in terms of dislocation pinning by polyvalent cation solutes. A sharp lower yield point often appears in the stress vs strain curves; their general shape is discussed qualitatively in terms of current concepts of dislocation multiplication and unpinning. (Author)

AD-291 844 Div. 25, 20
(TISTP/JW) OTS price $1.00

Armour Research Foundation, Chicago, Ill.
RADIATION EFFECTS ON SEMICONDUCTOR CATALYSTS.
Final rept., 1 Jan 61-31 Jan 62 on The Chemistry and Physics of Materials,
by H. C. Sosnovosky. Oct 62, 33p. incl. illus. 34 refs.
(Contract AF 33(616)7740, Proj. 7360)
(ASD TDR 62-233) Unclassified report

DESCRIPTORS: *Radiation effects, *Semiconductors, Germanium, Crystals, Ion bombardment, Adsorption, Gases, Electrical properties, Surfaces, Photoconductivity.

The effect of ion bombardment on carrier lifetime, photoconductivity, and surface structure of germanium (111) crystals was investigated after bombardment at voltages between 10 and 2000 v. It was found that the lifetime decreased significantly at bombarding voltages above 80 v and that the number of defects in the surface region increased simultaneously by several orders of magnitudes. These defects are most likely dislocations and vacancy clusters. Less stable defects were introduced at very low bombarding voltages but these too were found to affect the electrical properties of the bombarded surfaces appreciably. Preliminary results of the effect of adsorbed gases on the properties of ion bombarded surfaces, and the effect of neutron bombardment on the catalytic exchange of hydrogen with deuterium on etched surfaces are included. (Author)

AD-291 860 Div. 25
(TISTP/JW) OTS price $1.60

Massachusetts U., Amherst.
THE SCATTERING OF LIGHT BY HETEROGENEOUS SPHERES,
by R. S. Stein, P. R. Wilson, and S. N. Stidham. 15 Jan 62, 16p. incl. illus. 8 refs. (ONR technical rept. no. 42)
(Contract Nonr-335700, Proj. NR 356-378)
Unclassified report

DESCRIPTORS: *Scattering, *Light, Intensity, Refractive index, Spheres, Polymers, Films, Integral equations.

26. PRODUCTION AND MANAGEMENT

AD-291 236 Div. 26, 17
(TISTM/BRW) OTS price $6.60

Northrop Corp., Hawthorne, Calif.
QUARTZ LAMP RADIANT HEAT BRAZING LARGE REFRACTORY METAL HONEYCOMB SANDWICH PANELS.
Interim engineering progress rept., 10 July-10 Oct 62,
by D. B. Hugill and B. Gaiennie. 10 Oct 62, 61p. incl. illus. tables, 28 refs. (Rept. no. IR-7-937a(I))
(Contract AF 33(657)9810, Proj. 7-937a)
Unclassified report

DESCRIPTORS: *Sandwich panels, *Honeycomb cores, *Refractory materials, Radiant heating panels, Niobium alloys, Titanium alloys, Zirconium alloys, Molybdenum alloys, Soldering alloys, Metals, Manufacturing methods, Design, Processing, Brazing.

This project is planned to develop manufacturing methods and design criteria for refractory metal brazed sandwich structures of sufficient size to be practical for aerospace vehicles. The quartz lamp radiant heating system will be used. Investigation has demonstrated that diffusion bonded honeycomb core can be produced and that successful brazing can be accomplished under time, temperature, and inert gas atmosphere conditions representative of the quartz lamp radiant brazing system. Niobium alloy D-36 (Nb-10Ti-5Zr) and molybdenum alloy TZM (Mo-0.5Ti-0.08Zr) can be fabricated into honeycomb core by the diffusion bonding process with no degradation in physical properties. A solution of 2 HF - 25 HNO3 - 73 H2O offers good potential for prebraze cleaning of D-36 face sheets and core diffusion bonded with a zirconium foil interface. Excellent flowability and filleting have resulted from use of Ti-13V-11Cr-3Al braze alloy with D-36 in a 300 mm. argon atmosphere. Parametric analysis of heat shield panels is discussed and certain conditions are cited which preclude the use of 8 mil D-36 facing sheet for these panels. The sonic loading alone of the structural panels is shown to be a non-critical factor in determination of core depth. (Author)

AD-291 403 Div. 26, 27, 17
(TISTM/BRW) OTS price $1.50

Massachusetts Inst. of Tech. Div. of Sponsored Research, Cambridge.
EVALUATION OF ELECTRON BEAM WELDING FOR FABRICATION OF ULTRA HIGH STRENGTH STEEL ROCKET MOTOR CASES,
by R. E. Travis, V. P. Ardito, and C. M. Adams, Jr. Sep 62, 22p. illus. tables, 5 refs.
(Contract NOw 60-0417)
Unclassified report

DESCRIPTORS: *Rocket cases, *Steel, *Sheets, Mechanical properties, Pressure vessels, Cylindrical bodies, Electric arcs, Electron beams, Welds, Fracture (Mechanics), Structural shells, Welding, Processing.

Reliable tungsten inert gas and electron beam welding procedures have been established for the fabrication of low-alloy ultra-high strength sheet steels. Welds have been generated which exhibit yield strengths in the 230,000 psi range, and uni-axial ultimate tensile strengths in the 280,000 psi range and as high as 320,000 psi. Bi-axial ultimate tensile strengths in the 320,000 psi range and as high as 357,000 psi have also been realized. Cylindrical pressure vessels fabricated by the roll-and-weld technique and incorporating a longitudinal seam weld burst under hydrostatic pressure at a level of hoop stress slightly below the uni-axial ultimate tensile strength of the material, and substantially below the bi-axial tensile strength of the weld. Electron beam weld metal exhibits bi-axial strength superior to wrought material, far superior to arc weld metal, and is therefore associated with improved performance of roll-and-weld pressure vessels. (Author)

AD-291 609 Div. 26
(TISTM/REB) OTS price $10.50

Rocketdyne, Canoga Park, Calif.
INVESTIGATION OF CONDENSING VAPOR LUBRICATED

SELF-ACTING JOURNAL BEARINGS.
Annual rept., 1 Oct 61-30 Sep 62,
by W. Unterberg, J. S. Ausman, and G. K. Fischer.
30 Nov 62, 130p. incl. illus. tables, 16 refs.
(Rept. no. R-3911)
(Contract Nonr-361700, Proj. NR 061-126)
Unclassified report

DESCRIPTORS: *Journal bearings, *Lubrication, Design, Manufacturing methods, Operation, Condensation, Steam, Theory, Mathematical analysis, Thermodynamics, Hydrodynamics, Vapors.

The operating characteristics of condensing vapor self-acting journal bearings were investigated analytically and a steam bearing experiment was initiated. Thermohydrodynamic considerations suggest the isothermal equilibrium behavior of the lubricant. 'Linearized ph' analyses are carried out for an infinite and a finite heat transfer model. For the infinite length isothermal full plain journal bearing with constant lubricant mass the condensing vapor operation results in a bearing pressure limit at the saturation vapor pressure value. The load capacity of the condensing vapor bearing is correspondingly reduced below that of the non-condensing bearing. The experimental steam bearing rig and steam generation system and their operation are described. (Author)

AD-291 612 Div. 26, 17, 12
(TISTM/EJH) OTS price $4.60

Republic Aviation Corp., Farmingdale, N. Y.
CAPACITOR DISCHARGE METAL FORMING.
Interim technical progress rept. no. 7, 1 Sep-3 Dec 62,
by J. Christiana, P. D'Aguanno and others.
Dec 62, 44p. incl. illus. tables.
(Contract AF 33(600)42920, Proj. 70844)
(ASD TR 7-844, vol. 7) Unclassified report

DESCRIPTORS: *Metals, Sheets, *Electric discharges, *Manufacturing methods, Deformation, Processing, Heat treatment, Underwater explosions, Capacitors, Configurations, Airframes, Rocket cases, Guided missiles, Aluminum alloys, Wire, Electrodes, Dies.

Three dome configurations have been selected for the Phase IV work to evaluate capacitor discharge forming by actual parts production. The electrohydraulic forming of one of the dome configurations, a 40 inch Closure Head, is described. (Author)

AD-291 619 Div. 26, 17
(TISTM/EJH) OTS price $2.60

Republic Aviation Corp., Farmingdale, N. Y.
B-120VCA TITANIUM ALLOY EXTRUSION PROGRAM.
Interim technical engineering rept., 18 Aug-18 Nov 62,
by Murray H. Levine. 18 Nov 62, 31p. incl. illus. table.
(Contract AF 33(657)8746)
(ASD TR 8-103, vol. 1) Unclassified report

DESCRIPTORS: *Titanium alloys, *Extrusion, Airframes, Vanadium alloys, Chromium alloys, Aluminum alloys, Manufacturing methods, Drawing (Machine processing), Heat treatment, Mechanical properties, Tensile properties, Thickness.

The objective of this program is to develop and refine the hot extrusion process for production of 1/16 inch cross section tee shapes, followed by the development of a process for drawing the as-extruded tee shapes to .040 inch cross section. Secondly a thermal application is to be developed for the heat treatment of full length (20 ft) .040 inch thick drawn tee extrusions to meet target requirements of 190,000 psi tensile strength with 5% elongation. (Author)

AD-291 754 Div. 26, 15
(TISTB/LMH) OTS price $1.10

California U., Los Angeles.
NETWORKS OF QUEUES WITH CONTROLLED CUSTOMER-ARRIVAL RATES,
by James R. Jackson. 2 Nov 62, 7p. (Working paper no. 19; Research rept. no. 80)
(Proj. NR 047-003)
Unclassified report

DESCRIPTORS: *Management engineering, *Production, *Probability, Economics, Consumption, Industrial relations, Industrial psychology, Theory, Distribution theory.

This paper, which is a continuation of the author's recent paper, ''Networks of Queues with Controlled Service Rates,'' extends the equilibrium theory of networks of queues to systems where the instantaneous customer-arrival rate is an essentially arbitrary function of the total number of customers present in the system. (Author)

AD-291 896 Div. 26, 17
(TISTM/REB) OTS price $3.60

Nuclear Metals, Inc., Cambridge, Mass.
DEVELOPMENT OF DIES FOR EXTRUSION OF COMPLEX SHAPES OF STEEL AND REFRACTORY ALLOYS.
Interim technical documentary progress rept., 15 June-15 Sep 62,
by J. G. Hunt, R. G. Jenkins and others.
17 Dec 62, 24p. incl. illus. tables, 7 refs.
(Rept. no. NMI-9700.3)
(Contract AF 33(657)8798, Proj. 7-946)
Unclassified report

DESCRIPTORS: *Dies, Materials, Design, Extrusion, Steel, Tungsten alloys, Niobium alloys, Tantalum alloys, Molybdenum alloys, Ceramic coatings, Ceramic materials.

Significant improvement in the properties of ceramic-coated metallic, metal-fiber-reinforced ceramic, and refractory intermetallic dies, for use in the extrusion of refractory metals and steels, is sought. A state-of-the-art survey was conducted by reference to reports and by visits to experimental and production extrusion facilities experienced in extruding specialty steels and refractory metals. A survey of available materials revealed a number which are potentially fabricable into improved dies. Preliminary choices of material were guided by the agreement of known or predicted properties at various temperatures with characteristics desired in the dies. An indentor device for testing coated substrates was designed and its construction started. Hot pressing furnaces for consolidating the various materials were designed, built and tested. (Author)

27. PROPULSION SYSTEMS

AD-291 209 Div. 27, 4
(TISTM/TCG) OTS price $4.60

Naval Research Lab., Washington, D. C.
A SURVEY OF THE CHEMISTRY OF HIGH-VANADIUM OIL-ASH DEPOSITS IN NAVAL BOILERS.
Interim rept.,
by A. J. Pollard. 19 Nov 62, 38p. incl. illus. tables, 13 refs. (NRL rept. no. 5852)
Unclassified report

DESCRIPTORS: *Vanadium compounds, *Oils, *Deposits, *Boilers, Oxides, Boiler compounds, Boiler tubes, Physical properties, Chemical analysis, X-ray diffraction analysis, Corrosion, Chemical properties, Sodium compounds, Calcium compounds, Iron compounds, Sulfates, Metals, Carbon, Fluorescence, Test methods.

High-vanadium oil-ash deposits taken from the boilers of destroyers and carriers have been examined and a survey made of the chemistry of their components. Three compounds of V were identified: Na2O.V2O4.5V2O5, which appeared in every high-temperature deposit examined, and Na2O.2V2O5 and NaVO3, both of which were found only on screen tubes of two 1200-pound boilers having deposits especially high in sodium sulfate. Other compounds present in detectable quantities were Na2SO4, CaSO4, Fe3O4, CaCO3, Fe2(SO4)3, H2SO4, alpha-SiO2, and elemental C. All deposits consisted of one or more of these compounds, but in various proportions. The chemistry and physical properties of compounds in the system Na2O-V2O5 were compiled after a literature search which was augmented by an appropriate laboratory investigation. Three analytical methods of determining high concentration of V in oxide mixtures are described, as well as an X-ray diffraction method for estimating the relative quantities of crystalline Na2O.V2O4.5V2O5 and Na2O.2V2O5 in the presence of one another. (Author)

AD-291 248 Div. 27, 26, 17
(TISTM/BRW) OTS price $7.60

Pratt and Whitney Aircraft, East Hartford, Conn.
RESEARCH AND DEVELOPMENT OF TITANIUM ROCKET MOTOR CASE.
Quarterly interim technical rept. no. 8, 1 Apr-30 June 62,
by H. Alan Hauser and W. E. Helfrich. 31 July 62, 1v. incl. illus. tables.
(Contract DA 19-020-ORD-5230, Proj. TB4-004)
(WAL TR 766.2/1-7) Unclassified report

DESCRIPTORS: *Rocket cases, *Titanium alloys, Aluminum alloys, Chromium alloys, Vanadium alloys, Welds, Mechanical properties, Tensile properties, Electric arcs, Electron beams, Welding rods, Fracture (Mechanics), Aging, Heat treatment, Pressure vessels, Manufacturing methods, Welding.

Single-pass B-120 VCA titanium alloy TIG welds (as-welded) made with Cu fixturing exhibit (1) less porosity, and (2) superior resistance to crack initiation and propagation at weld porosity under cyclic loading, as compared to similar welds produced with steel fixturing. Based on limited data, single-pass Ti-6Al-4V alloy TIG welds made with AMS 4951 (commercially pure titanium) filler wire and copper fixturing (weldment heat treated to 160,000 psi parent metal yield strength; 1100 F for two hours after welding), show less tendency for crack initiation at weld porosity under cyclic loading than B-120 VCA titanium alloy single-pass TIG welds (as-welded, Cu fixturing). Ti-6Al-6V-2Sn alloy TIG welds, made with AMS 4951 filler wire and Cu fixturing, show poor bend ductility in the as-welded condition and both poor tensile and bend ductility after aging at 1100 F or annealing at 1300 to 1500 F. (Author)

AD-291 497 Div. 27, 17
(TISTM/BRW) OTS price $1.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
MATERIAL OPTIMIZATION FOR LIQUID PROPULSION SYSTEMS,
by B. Steverding. 8 Nov 62, 23p. incl. illus. tables, 3 refs. (Rept. no. RR-TR-62-7)
Unclassified report

DESCRIPTORS: *Combustion chambers, *Liquid rocket propellants, Materials, Alloys, Metals, Nickel, Nickel alloys, Chromium alloys, Iron alloys, Molybdenum alloys, Manganese alloys, Silicon alloys, Aluminum alloys, Titanium alloys, Copper alloys, Tantalum alloys, Heat exchangers.

A mathematical method is developed by means of which the suitability of materials for the construction of liquid propellant thrust chambers is determined. Among the various candidate materials, alloys with specific property spectra are evaluated so that the basic function of a heat strength, minimum weight, reliability, and short-time application. A dimensionless factor is calculated for a number of candidate alloys, which determines the feasibility of the specific metal for thrust chamber construction. (Author)

AD-291 559 Div. 27
(TISTA/SEB) OTS price $4.60

Arde-Portland, Inc., Paramus, N. J.
COOLED SOLID PROPELLANT ROCKET NOZZLES.
Summary rept. no. 4, 1 Apr-30 Sep 62,
by Philip Wacks. 30 Sep 62, 39p. incl. illus. tables.
(Contract DA 30-069-ORD-3099)
Unclassified report

DESCRIPTORS: *Rocket motor nozzles, *Lithium, Solid rocket propellants, Convection, Gases, Heat transfer, Thermocouples, Pressure, Combustion, Exhaust gases, Temperature, Rocket motors, Test methods, Seals, Liquid metals, Cooling, Liquid cooled, Coolants.

Contents:
Uncooled nozzle tests
Test data reduction - core gas convection coefficients
Method of data reduction
Predicted core gas convection coefficients
Comparison of predicted and derived coefficients
Labyrinth seal tests
Determination of the core gas convection coefficients
Methods of predicting core gas convection coefficients
Determination of the core gas properties

AD-291 654 Div. 27, 26
(TISTM/RGR) OTS price $8.10

Douglas Aircraft Co., Inc., Santa Monica, Calif.
SEGMENTED ROCKET MOTOR CASE PROGRAM.

Quarterly progress no. 2, 15 July-15 Oct 62,
by R. G. Carpenter and T. R. Jeffus. 15 Oct 62,
82p. incl. illus. tables (Rept. no. SM-42516)
(Contract AF 04(611)8184, Proj. 3059)
Unclassified report

DESCRIPTORS: *Rocket cases, Rocket motors, Laminates, Processing, Design, Glass textiles, Test methods, Mechanical properties, Computer logic, Joints, Resins, Composite materials.

This is an interim report on a research and development program directed toward design, development, fabrication, and testing of lightweight motor case segments, culminating in a design applicable to large (160- to 240-in. dia.) segmented solid propellant rocket motors. A summary of work accomplished on the bench test program and on the 43-in. dia. subscale segments is included. (Author)

AD-291 655 Div. 27
(TISTM/REB) OTS price $9.10

Douglas Aircraft Co., Inc., Santa Monica, Calif.
SEGMENTED ROCKET MOTOR CASE PROGRAM.
Quarterly progress rept. no. 1, 15 Apr-15 July 62,
by R. G. Carpenter and T. R. Jeffus. 15 July 62,
100p. incl. illus. tables (Rept. no. SM-42097)
(Contract AF 04(611)8184, Proj. 3059)
Unclassified report

DESCRIPTORS: *Rocket motors, *Rocket cases, Composite materials, Steel, Tests, Stresses, Analysis, Manufacturing methods, Glass textiles, Resins, Adhesives, Design.

Research and development was directed toward design, development, fabrication, and testing of lightweight motor case segments, culminating in a design applicable to large (160 to 240 in. diam.) segmented solid propellant rocket motors. A discussion is included of the basic motor case segment design concept of the design of a 43-in.-diam. subscale motor case segment, and of the test program being conducted to implement the segment design. (Author)

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-291 417 Div. 28
(TISTB/MS) OTS price $2.60

California U., Berkeley.
COGNITIVE CONSISTENCY AND PERFORMANCE IN THE AUTOKINETIC SITUATION.
Final rept.,
by Edward E. Sampson and Chester A. Insko. 1961,
21p. incl. tables, refs.
(Contract Nonr-22291)
Unclassified report

DESCRIPTORS: *Behavior, *Perception, Social communication, Attitudes.

An experiment was conducted testing certain implications of a balance or cognitive consistency model of behavior. It was hypothesized that a person (P) would respond to another person's (O's) judgments of light movement in the autokinetic situation as a function of the attraction relationship between them and the initial similarity in their judgments. By using an assistant playing the role of another subject, it was possible to manipulate experimentally P's liking or disliking of O, and the initial discrepancy between P's and O's judgments of light movement. As compared with a condition of cognitive balance, under the conditions of cognitive imbalance--where either P likes O and initially is dissimilar to O or P dislikes O and initially is similar to O--we find a greater tendency for P to change his own judgments of the light movement, and to feel anxious or nervous while making these judgments. In addition, the direction of P's judgmental change is such as to increase his similarity to O when he likes O and to decrease this similarity when he dislikes O. These findings are taken as supporting a cognitive consistency model of interpersonal behavior and as having broad implications for the area of social influence and conformity. (Author)

AD-291 424 Div. 28
(TISTB/DGH) OTS price $3.60

Group Effectiveness Research Lab., U. of Illinois, Urbana.
THE EFFECT OF PARTICIPATORY AND SUPERVISORY LEADERSHIP ON GROUP CREATIVITY,
by Lynn R. Anderson and Fred E. Fiedler. Nov 62,
31p. incl. tables, 10 refs. (Technical rept. no. 7)
(Contract Nonr-183436, Proj. NR 177-472)
Unclassified report

DESCRIPTORS: *Psychology, *Leadership, *Group dynamics, Students, Attitudes, Behavior, Test methods, Effectiveness.

The creativity of four-man groups under two conditions of leadership is compared. Subjects were 90 freshman and sophomore Navy ROTC midshipmen and 30 NROTC seniors who served as group leaders. In 15 of the groups, the leaders acted as chairmen who directed the group discussions and contributed to the task solution. In the other 15 groups, leaders acted in a supervisory capacity: they directed and guided group discussion and they were allowed to encourage members or to reject ideas, but the leaders were prohibited from contributing to the solution of the task. Groups having participatory leaders were generally superior in quantity of output. Groups under supervisory leaders were superior in the quality of the product. Groups also differed in the influence of leader intelligence and ability scores, as well as the leaders' satisfaction with their role. (Author)

AD-291 425 Div. 28
(TISTB/DGH) OTS price $7.60

Group Effectiveness Research Lab., U. of Illinois, Urbana.
TASK SET AND ATTITUDINAL HETEROGENEITY AS DETERMINANTS OF DYADIC CREATIVITY,
by Harry C. Triandis, Eleanor H. Mikesell, and Robert B. Ewen. Nov 62, 72p. incl. illus. tables, 16 refs. (Technical no. 8)
(Contract Nonr-183436, Proj. report NR 177-472)
Unclassified report

DESCRIPTORS: *Psychology, *Psychometrics, *Group dynamics, Factor analysis, Effectiveness, Personality, Attitudes, Measurement, Reasoning.

On the basis of pre-test measures, male undergraduate dyads were formed so as to be homogeneous in creative abilities and either homogeneous or heterogeneous in attitudes. Level of abilities was effectively controlled. All dyads solved two creativity problems, half in one sequence and half in the reverse sequence. The results indicated that heterogeneity of attitudes increased dyadic creativity. There was also a sequence effect, which was interpreted as due to the set induced by the problem worked on first, and to fatigue. (Author)

AD-291 450 Div. 28
(TISTB/LMH) OTS price $9.10

Hearing and Communication Lab., Indiana U., Bloomington.
PSYCHOPHYSICS AND SIGNAL DETECTION.
Final rechnical rept.,
by James P. Egan and Frank R. Clarke. 12 Nov 62, 1v. incl. illus. table.
(Contract AF 19(628)266)
(ESD TDR 62-305) Unclassified report

DESCRIPTORS: *Signals, *Hearing, *Auditory perception, Noise, Wave transmission, Probability, Analysis of variance, Auditory thresholds, Measurement, Detection, Psychology.

The theory of signal detectability incorporates into a single model many disparate factors which affect the detection and recognition of signals. This theory emphasizes that the decision of an observer may depend upon (1) the informational content of the stimulus, (2) the information available to the observer before the presentation of the stimulus, (3) the properties of the sensory analyzer, and (4) motivational variables as they relate to the consequences of each decision. TSD stipulates procedures by which the data should be obtained in an experiment on signal detection; the theory then provides the process by which the data should be analyzed in order to obtain a measure of the capacity for discrimination. The aspects of theory of signal detection most relevant to psychophysics are developed in terms of the fundamental detection problem. In order to present the concepts in a concrete experimental setting, the fundamental detection problem is discussed in the context of auditory detection. (Author)

AD-291 552 Div. 28
(TISTB/DGH) OTS price $3.60

Yale U., New Haven, Conn.
THINKING,
by Donald W. Taylor. Sep 62, 33p. incl. illus. refs. (Technical rept. no. 7)
(Contract Nonr-60920, Proj. NR 150-166)
Unclassified report

DESCRIPTORS: *Psychology, *Reasoning, Factor analysis, Theory.

Three different approaches to a theory of thinking are discussed: the decision-making process, the problem-solving process, and the creative process. These were selected because the three differ markedly from one another in the way in which their concepts were developed and in the methods by which data are obtained to test their predictions.

AD-291 577 Div. 28
(TISTB/LMH) OTS price $2.60

Goucher Coll., Towson, Md.
TEMPORAL MECHANISMS ASSOCIATED WITH INFORMATION PROCESSING BY THE VISUAL SYSTEM.
Final rept.,
by Daniel M. Forsyth. 31 May 62, 17p. incl. illus. tables, 22 refs.
(Contract AF 19(604)8502, Proj. 9670)
(ESD TDR 62-207) Unclassified report

DESCRIPTORS: *Vision, *Visual signals, *Information theory, Stimulation, Sensitivity, Theory.

The response of the visual system to complex intermittent stimulation was investigated. The stimuli consisted of repeatedly alternating trains of square-wave pulses. Both the number and period of the pulses is the two alternating trains were varied under more than 450 experimental conditions. Criterion measurements of fusion were obtained for each of two observers for all conditions. The stimulus waveforms at threshold were analyzed, and the frequency and amplitude of the fundamental obtained. Analysis was facilitated by use of an IBM 7070 computer. The resultant data were plotted in the form of amplitude-sensitivity curves for the two observers, and were found to be consistent with the view that the visual system operates as a low-pass filter. (Author)

AD-291 620 Div. 28
(TISTB/OGH) OTS price $2.60

Illinois U., Urbana.
GROUP AND ORGANIZATIONAL FACTORS INFLUENCING CREATIVITY.
Annual rept., 30 Sep 61-1 Oct 62,
by Fred E. Fiedler, Lawrence M. Stolurow, and Harry C. Triandis. 1 Oct 62, 19p. incl. tables, 11 refs.
(Contract Nonr-183436)
Unclassified report

DESCRIPTORS: *Psychology, *Group dynamics, *Leadership, *Reasoning, *Attitudes, Personality, Behavior, Stress (Psychology), Man, Effectiveness.

This project investigates various training, group-structural, and leader variables which affect teamwork in tasks requiring creativity. Although a variety of group situations are investigated, the major emphasis is on the study of the type of team processes involved in research and development work. The first sub-project deals with methodological problems related to criterion development, and with training and task factors which influence individual and group creativity. The second investigates compositional factors which determine the effectiveness of individuals in groups. The third is concerned with leadership factors, such as the leader's perceptions and attitudes, and their effect on group performance under various conditions, such as intra-group conflict or external stress. (Author)

AD-291 838 Div. 28
(TISTB/DGH) OTS price $1.60

Amherst Coll., Mass.
MEASURING ELEMENTS OF NEED ACHIEVEMENT.

Final rept.,
by Robert C. Birney, Harvey Burdick, and Richard C. Teevan. Nov 62, 13p.
(Contract Nonr-230902)
Unclassified report

DESCRIPTORS: *Psychometrics, *Achievement tests, Needs, Attitudes, Measurement, Students, Factor analysis.

Studies demonstrated that the effect of motivation varies with modes of cognition of the situation, and a comprehensive theory embracing the two sets of variables has been developed. (Author)

AD-291 874 Div. 28
(TISTB/DGH) OTS price $1.60

Pittsburgh U., Pa.
BEHAVIOR IN GROUPS. TEST OF A PROPOSED THEORY OF LEADERSHIP.
Annual rept. no. 8,
by Bernard M. Bass. 15 Nov 62, 11p.
(Contract N7onr-35609)
Unclassified report

DESCRIPTORS: *Group dynamics, *Leadership, Psychometrics, Analysis, Attitudes, Industrial psychology, Behavior, Theory.

Four areas of research during 1961-62 are briefly outlined. First, a series of studies were accepted for publication and others were completed relating orientation to a variety of interpersonal effects. Second, further work was reported on the simulation of manufacturing organizations. Third, several studies were begun examining the attitudes and behavior of the man-in-the-middle--any man in the organization with a boss and subordinates. Fourth, several reports of research testing selected hypotheses drawn from the proposed theory of leadership were published or accepted for publication along with some applied analyses. (Author)

AD-291 878 Div. 28
(TISTB/DGH) OTS price $1.60

Electronic Systems Div., Air Force Systems Command, Bedford, Mass.
A COMPARATIVE EVALUATION OF VIBROTACTILE WARNING SIGNAL POTENTIAL,
by William H. Sumby. Nov 61, 17p. incl. illus. tables (Rept. no. ESD-TDR 61-24)
(Proj. no. 7682)
Unclassified report

DESCRIPTORS: *Tactical perception, *Auditory perception, *Visual perception, Stimulation, Reflexes, Vibration, Signals, Reaction time.

The discriminative reaction times to auditory, visual and vibrotactile stimuli are compared. Reaction times to vibrotactile signals are at least as short as the reaction times for the other modalities, although more incorrect responses were made using that sense. Of greatest interest, however, the probability of a response being made to a vibratory signal appears to be the highest of the three. The implications of these findings are discussed. (Author)

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-291 598 Div. 29
(TISTB/LMH) OTS price $1.10

4750th Test Squadron (Tactics and Application Engineering) Tyndall Air Force Base, Fla.
A/P22S-3 SUIT CONTROLLER.
Test plan,
by Clarence L. Langford. 29 Nov 62, 12p.
(Proj. ADC/73AD/62-29)
Unclassified report

DESCRIPTORS: *Pressure suits, *Parachutes, Design, Test methods, Simulation, Acceptability, Safety devices, Operation.

A condition exists on the larger size suits which causes interference between the suit mounted controller and the parachute harness. ASD proposed that the problem be alleviated by utilizing higher than average index numbers when size-adjusting the harness. This requires adjustment of the controller by rotation clockwise approximately 60 degrees (one mounting screw hole) to alleviate interference between the lower oxygen lead to the controller and the harness adjustment buckle. This project will determine if the proposed fix is adequate. (Author)

30. RESEARCH AND RESEARCH EQUIPMENT

AD-291 230 Div. 30, 2
(TISTW/DLW) OTS price $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
PROJECT 861 COMPUTER PROGRAM SYSTEM. VENUS POINTING DATA,
by J. D. Drinan. 19 Nov 62, 25p. 2 refs.
(Rept. no. 21G-7)
(Contract AF 19(628)500)
(AFESD TDR 62-244) Unclassified report

DESCRIPTORS: *Programming, *Venus, *Radio astronomy, *Data processing systems, Punched card methods, Teletype systems, Doppler systems, Mathematical computer data, Tracking, Antennas.

The combined use of two 7090 computer programs provides the Project 861 system with the capability of automatically pointing its antennas at the planet Venus. The first of these, known as the Venus Ephemeris Program, was written by W. Mason and V. Mason. This program provides printouts of the Venus Ephemeris at one-minute intervals from any selected Earth location for specifiable time periods. The second of these, the Venus Conversion Program (KNO2), uses the time, azimuth and elevation information stored on the BCD tape made up by the Ephemeris Program to generate another BCD tape containing five-second positions in the familiar Project 861 A-block-B-block BCD-TTY format. Essentially then, KNO2 must locate a particular time period on the Ephemeris tape, interpolate between successive one-minute positions and perform a format conversion on the results. No range or doppler information is contained in the KNO2

output. The output tape, once produced, must undergo the usual final processing to obtain the desired teletype tape and its accompanying printout. (Author)

AD-291 409 Div. 30
(TISTA/GEC) OTS price $5.60

AVCO Everett Research Lab., Mass.
SHOCK TUBES FOR HIGH TEMPERATURE GAS KINETICS,
by Arthur Kantrowitz. Oct 62, 51p. incl. illus. tables, refs. (Research rept. no. 141)
Unclassified report

DESCRIPTORS: *Shock tubes, Gases, Reaction kinetics, Enthalpy, Pressure, Velocity, Shock waves, Plasma physics, Gas ionization, Test facilities, High temperature research.

The adaptation of the shock tube to the production of high temperature gases has provided a powerful tool for the study of gases at temperatures beyond those obtainable in furnaces. The essential advantages of shock tubes over electrical discharge devices is the capability to produce a homogeneous gas sample (HGS) with enthalpy and pressure which can be dependably calculated from the measured shock velocity and the conservation laws. The variety of conditions which can be reached and the precision and dimensions of the HGS which can be produced are presented. Diaphragm type shock tubes are capable of heating gases to temperatures sufficient for the study of all chemical reactions and many electronic processes. The enthalpy and pressure of the gas sample can be calculated from the conservation laws with precision falling from 1 to 10% as we move from lower to higher temperatures. Knowledge of the gas state in shock tubes has allowed the development of numerous diagnostic devices and their application to a tremendous variety of problems in gas kinetics. The advent of electromagnetically driven shock tubes opens up the possibility of achieving similar advantages at temperatures up to millions of degrees. This will accelerate the study of very energetic excitation and ionization phenomena. It will also contribute to the study of completely ionized plasmas in which at high temperatures, collisions become a very rare process. The understanding of collision free plasmas is basic to astrophysics and to the design of thermonuclear fusion reactors. (Author)

AD-291 469 Div. 30, 27, 1
(TISTM/REB) OTS price $21.00

Oklahoma State U. School of Mechanical Engineering, Stillwater.
NONDESTRUCTIVE TESTING PROJECT.
Rept. no. 2, 1 Sep 61-31 Aug 62.
31 Aug 62, 1v. incl. illus. tables, refs.
(Contract AF 34(601)9879)
Unclassified report

DESCRIPTORS: *Nondestructive testing, *Turbojet engines, *Cleaning, *Bibliography, Ultrasonics, Fatigue (Mechanics), Fracture (Mechanics), Detection, Compressor blades, Test methods.

The material presented is a compilation of interim reports submitted at various times throughout the contract year and an exhaustive literature survey of pertinent nondestructive testing publications and of allied subject areas. The primary emphasis was on the evaluation or development of nondestructive tests for use in the depot overhaul of turbojet engines. As the success of any inspection system demands extreme cleanliness of the elements involved, considerable attention was given to chemical and ultrasonic cleaning methods. (Author)

AD-291 470 Div. 30
(TISTP/TL) OTS price $4.60

Operations Research Center, U. of Calif., Berkeley.
MULTIPLE ENTRIES IN TRAFFIC
by W. S. Jewell. 31 July 62, 44p. incl. illus. 14 refs. (Research rept. no. 29; IER 172-34)
(Contract Nonr-22283)
Unclassified report

DESCRIPTORS: *Statistical distributions, *Probability, *Traffic, *Operations research, Integral transforms, Statistical analysis, Statistical functions, Integration, Statistical processes.

A general multiple-acceptance criterion is postulated, and the counting distribution of the number of gaps to appear across the intersection is obtained under different assumptions about the way in which the gaps are counted. From this distribution is derived the waiting-time distribution for the nth car in line on the secondary road. Consideration of the first two moments of these distributions in the limit of large observation times gives some simple asympotic results, and leads to the definition of a new measure of traffic interference called the transmission factor. Special results for particular acceptance criteria and main stream headway distributions are obtained and discussed. Finally, some limited results on the queueing problem on the secondary road are found and related to similar results of other authors. (Author)

AD-291 492 Div. 30, 18, 3, 20
(TISTE/CRJ) OTS price $1.60

General Electric Co., Falls Church, Va.
SYSTEMS DESIGN AND PROGRAMMING ASSISTANCE.
Final rept., 1 July-30 Sep 62.
5 Nov 62, 16p. incl. table (Publication no. CAW-178)
(Contract AF 33(657)8150)
(ESD TDR 62-343) Unclassified report

DESCRIPTORS: *Digital computers, *Data processing systems, *Data storage systems, *Military intelligence, Nuclear weapons, Nuclear warfare, Selection, Military operations, Programming, Biological warfare, Dosage, Mathematical prediction.

Efforts concern the refinement and development of systems, techniques, and procedures for utilizing digital computers in the following capacities: (1) storage of a large volume of intelligence information which is organized for accessibilfty; (2) effective manipulation of this information to provide direct assistance to intelligence producers and users; and (3) Air Staff war gaming activities, such as contamination prediction, optimum DGZ selection, and target weighting assignment. (Author)

AD-291 685 Div. 30
(TISTP/JW) OTS price $14.50

Air Force Cambridge Research Labs., Bedford, Mass.
HISTORY AND PROGRESS OF AFCRL FOR THE PERIOD JANUARY 1961-JUNE 1962.
Annual rept. no. 1.
Oct 62, 212p. incl. illus. (Rept. no. AFCRL-62-714)
Unclassified report

DESCRIPTORS: *Research program administration, *Laboratories, Meteorology, Solid state physics, Geodetics, Electromagnetic waves, Solar systems, Plasma physics, Information retrieval.

AD-291 693 Div. 30
(TISTB/DGH) OTS price $1.10

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
HIGH SPEED COMPUTER SYSTEM RESEARCH.
Appendix to final rept. on Summary of Research and Bibliography.
30 Sep 62, 10p.
(Contract NObsr-77603)
Unclassified report

DESCRIPTORS: *Bibliography, *Research program administration, *Naval research, Theses, Control systems, Programming, Thin films, Computers.

AD-291 694 Div. 30
(TISTP/TL) OTS price $5.60

Michigan U. Coll. of Engineering, Ann Arbor.
FALLING-SPHERE EXPERIMENT FOR UPPER-AIR-DENSITY: INSTRUMENTATION DEVELOPMENTS.
Final rept.,
by H. F. Schulte, D. A. Robinson, and J. L. Wagener. Apr 62, 51p. incl. illus. tables, 51 refs. (Rept. no. 03558-6-F)
(Contract AF 19(604)6185, Proj. 6690)
(AFCRL 62-662) Unclassified report

DESCRIPTORS: *Free fall models, *Spheres, *Accelerometers, *Upper atmosphere, Air, Density, Instrumentation, Tests, Temperature.

The continuing development of the instrumentation for the falling-sphere experiment for upper-air density and temperature is described. A multiple-circuit cavity for the accelerometer, which permitted the elimination of the wire bobbin contact, was developed. A moving iron solenoid caging device resulted in a smaller accelerometer requiring less power than the previous model. A new Attwood's machine permitting laboratory tests at 1/1000 g was constructed. Electronic circuits were developed to replace the intervalometer motor. Circuits were also devised to permit long transit times and to provide discrimination between start and stop pulses. Four spheres and accelerometers for flight test were constructed. (Author)

AD-291 700 Div. 30
(TISTP/TL) OTS price $8.10

RCA Defense Electronic Products, Burlington, Mass.
THEORETICAL AND COMPUTER STUDY OF CONVOLUTIONAL CODES AND SEQUENTIAL DECODING.
Final rept.,
by Walter R. Wadden, David M. Jones, and Julian Bussgang. Sep 62, 67p. incl. illus. tables.
(Contract AF 19(628)436, Proj. 4610)
(AFCRL 62-756) Unclassified report

DESCRIPTORS: *Sequential analysis, *Coding, *Probability, *Digital computers, Errors, Theory, Simulation, Reliability, Communication systems, Communication theory, Noise, Programming.

The study of sequential decoding for the binary symmetric channel is summarized. The program included the analytical and experimental evaluation of sequential decoding algorithms. The experimental investigation required extensive use of a general-purpose computer for simulation studies. The decoders are compared in terms of the complexity of the special-purpose computer required to implement each algorithm on the basis of a set probability of a decoding error rather than a set constraint length. (Author)

AD-291 720 Div. 30
(TISTP/TL) OTS price $5.60

System Development Corp., Santa Monica, Calif.
BUILDING A MODEL USING SIMPAC,
by Charles A. Kribs. 15 Nov 62, 51p. incl. illus. (Technical memo. no. TM-602/300/00)
Unclassified report

DESCRIPTORS: *Research program administration, *Digital computers, *Simulation.

A modeling of a system using SIMPAC (Simulation Package) is described. A hypothetical computer shop based on the IBM 7090 installation at System Development Corporation was chosen as the system to be modeled. This model is not intended to represent the complete computer complex or to be all-inclusive in the specific area chosen, but is intended to show the methods and applicability of SIMPAC. SIMPAC is defined as a package which includes both a method of modeling and a means of expressing and manipulating the model. (Author)

AD-291 726 Div. 30
(TISTP/JW) OTS price $2.60

System Development Corp., Santa Monica, Calif.
STAGES IN THE DESIGN AND DEVELOPMENT OF AN INFORMATION PROCESSING SYSTEM,
by Lorraine G. Gay. 9 Nov 62, 22p. incl. illus. 9 refs. (Rept. no. SP-1023)
Unclassified report

Presented at the Annual Convention of the American Association of Medical Record Librarians, 2 Oct 1962, St. Louis, Mo.

DESCRIPTORS: *Data processing systems, *Information retrieval, Computer logic, Design, Feasibility studies.

Chronicles a system research and design effort conducted jointly by the Department of Medicine and Surgery of the Veterans Administration and the System Development Corporation of Santa Monica. States that the purpose of this study is to select and analyze information so as to develop concepts for the over-all planning of an integrated management information system for the Department of Medicine and Surgery at the V.A. (Author)

AD-291 796 Div. 30
(TISTB/LMH) OTS price $2.60

Navy Electronics Lab., San Diego, Calif.
EXPERIMENTAL STUDY OF BINARY CODED KEYSETS.
Research and development rept.,
by K. M. Newman, R. Coburn, and R. C. McMahan.
24 Sep 62, 26p. incl. illus. tables, refs.
(NEL rept. no. 1137)
Unclassified report

DESCRIPTORS: *Computers, *Data processing systems, *Digital computers, Data storage systems, Analysis of variance, Punched card methods, Magnetic tape, Information retrieval, Design, Coding, Effectiveness, Human engineering.

Factors affecting the efficiency of man-machine systems, including the design and use of displays and controls, were determined. The work covered by this report is an experimental study of five keyset entry techniques for use in real-time computer-aided systems. Both qualitative and quantitative data can be entered accurately and rapidly using a four-key binary coded decimal keyboard. Keyset design has a direct bearing on speed-vs.-error trade-off by operators. Encoding tasks, if kept fairly simple, can be performed by experienced operators as part of information entry without detriment of the over-all process. Patterned key pressing by the touch system can be used efficiently by trained operators. Recommendations are: (1) conduct a controlled study comparing the best form of the experimental keyset developed for this study with the Remington Rand Univac NTDS Keyset currently in use; (2) keep keyset information entry in binary form to permit direct computer input and avoid costly conversion units; (3) design keysets to permit patterned and sequential entry of all information without visual reference to the keyset, although visual feedback; (4) plan the sequence of keyset entry processes so that they conform to natural human motor responses and habits; and (5) design keysets with the flexibility and capacity of trained operators in mind. (Author)

AD-291 807 Div. 30, 8
(TISTE/CAM) OTS price $6.60

Systems, Inc., Orlando, Fla.
INCREASED ACCURACY CRYSTAL TEST SET.
Final rept., May 61-June 62,
by S. B. Boor and R. F. Purnell. June 62, 41p. illus.
(Contract DA 36-039-sc-87294, Proj. 3A-99-15-004-03)
Unclassified report

DESCRIPTORS: *Test sets, *Oscillator circuits, Crystals, Crystal ovens, Feedback oscillators, Temperature control, Frequency multipliers, Voltmeters, Tuned circuits, Switching circuits, Impedance, Reliability.

The results of the development and design of an improved crystal test set covering the frequency range of 0.8 to 20 megacycles are presented. An analysis of the circuit, description of the delivered test sets, and typical test data are also included. The test set is of a Crystal Impedance Meter Type and includes such features as power setability (0.01 to 1.0 milliwatts), improved accuracy (1 X 10 to the -6th power), and high repeatability (1 X 10 to the -8th power). Other features incorporated into the test set include decade resistance substitution, load capacitance insertion, a precision crystal oven with temperature control, frequency multiplication and an R. F. voltmeter. (Author)

AD-291 822 Div. 30
(TISTW/PCR) OTS price $7.60

Utah Research and Development Co., Salt Lake City.
TERMINAL BALLISTIC INVESTIGATION OF THE IMPACT AND EFFECT OF ULTRA HIGH SPEED MICRON-SIZE PARTICLES PRODUCED ON HYPERVELOCITY IMPACT.
Final rept.
Nov 62, 71p. incl. illus. tables, 7 refs.
(Contract AF 08(635)2099)
(APGC TDR 62-69) Unclassified report

DESCRIPTORS: *Hypervelocity guns, *Hypervelocity projectiles, Velocity, Cratering, Penetration, Volume, Scale, Pellets, Microscopes, Theory, Spallation, Range, Targets, Photographs, Terminal ballistics.

The results of the investigations of spray particle impact are reported. A method was devised to measure the velocity and calculate the diameter of the spray particle in flight. The crater produced at impact was measured to obtain the diameter and several attempts to measure penetration and volume are described. A scaling law relating macro size craters to micro craters produced at the same velocity is presented. (Author)

AD-291 850 Div. 30
(TISIP/RLT) OTS price $6.00

Armed Services Technical Information Agency, Arlington, Va.
COMPUTERS AND DATA PROCESSING SYSTEMS. AN ASTIA REPORT BIBLIOGRAPHY,
comp. by Rulon L. Thayne, Elizabethe H. Hall, and Herman Miles. 31 Aug 62, 1v. 2,378 refs.
Unclassified report

DESCRIPTORS: *Computers, *Data processing systems, *Analog computers, *Digital computers, *Analog-to-digital converters, *Bibliography, *Data storage systems, *Data transmission systems, *Programming, Analog systems, Circuits, Control systems, Communication systems, Digital systems, Fire control computers, Digital recording systems, Magnetic core switch, Punched card method, Memory devices, Display systems, Guided missile computers, Machine translation, Magnetic tape, Magnetic cores, Magnetic recording systems, Mathematical computer data.

An ASTIA Report Bibliography on computers and data processing systems and closely related topics is presented. Citations are included for documents cataloged by ASTIA from 1953 through August 1962. Entries are arranged in alphabetical order by subject area within each catagory and its subdivisions. Reports published by Department of Defense contractors are listed alphabetically by source, contract number and title; military reports are arranged by source and then by title. A broad spectrum of entries covering areas such as data handling devices, computer hardware components, storage devices and programming are included.

31. SHIPS AND MARINE EQUIPMENT

AD-291 467 Div. 31, 14
(TISTM/BRW) OTS price $5.60

Naval Boiler and Turbine Lab., Philadelphia, Pa.
DEVELOPMENT OF FACILITIES FOR SHIPBOARD CHEMICAL CLEANING OF BOILERS.
Final evaluation rept.,
by S. Greenberg. 30 Nov 62, 46p. (Proj. no. P-360)
Unclassified report

DESCRIPTORS: *Boilers, *Boiler tubes, Cleaning, Marine engines, Shipborne, Deposits, Sulfamic acids, Thiourea derivatives.

Several descalants that can be safely handled by non-technical ships' personnel were evaluated for chemical cleaning of shipboard boilers. The selected descalant must be a non-toxic, water-soluble solid formulation and its solutions posses scale removing properties similar to inhibited hydrochloric acid and at the same time be non-corrosive to boiler steels. Wyandotte Chemicals Corporation, under contract with the Bureau of Ships, conducted bench-scale evaluations on scaled boiler tube sections using various formulations. The Laboratory continually monitored the application of the Wyandotte-suggested procedures to full scale boiler cleaning trials. Based on these tests, a chemical cleaning procedure was developed that is suitable for shipboard use. The selected descalant formulation consists of 89% sulfamic acid, 6% citric acid and 5% diethylthiourea. (Author)

32. MISCELLANEOUS ARTS AND SCIENCES

AD-291 412 Div. 32
(TISTB/DGH) OTS price $1.50

Antioch Coll., Yellow Springs, Ohio.
X-RAY ANTHROPOMETRY OF THE HAND.
Final rept. on Human Performance in Advanced Systems,
by John Haskell Vicinus. Sep 62, 38p. incl. illus. tables, 14 refs.
(Contract AF 33(616)6792, Proj. 7184)
(AMRL TDR 62-111) Unclassified report

DESCRIPTORS: *Anthropology, *Anthropometry, *Hands, Tables, X rays.

A comprehensive descriptive summary of the X-ray anthropometry of the hand is presented. The 253 subjects chosen for measurement were selected to be representative of the Air Force population in hand length and hand breadth. Summary statistics for 24 lengths and 20 breadths for both the left and the right hands are presented. Also included in the report are complete intercorrelation matrices for both hands indicating the degree of interrelationship between the 44 dimensions. Analysis of the data indicates that, in general, the right hand tends to be longer and broader than the left, the right hand also showing slightly greater variability in length and less variability in breadth than the left. The lowest correlations occur in the relationships between length and breadth dimensions, and the highest are to be found within the length dimensions of each of the five digits. (Author)

AD-291 613 Div. 32
(TISTB/DGH) OTS price $4.60

RAND Corp., Santa Monica, Calif.
THE AMERICAN PEACE MOVEMENT: A STUDY OF ITS THEMES AND POLITICAL POTENTIAL,
by A. E. Wessel. Dec 62, 42p. 37 refs. (Rept. no. P-2679)
Unclassified report

DESCRIPTORS: *Political science, Warfare, Public opinion, Attitudes.

Contents:
Introduction
Why study the peace movement
The approach to the study
The public debate
Herman Kahn and his critics
Some reasonable concerns
The growth of the peace movement
The changing popular attitudes toward war
The spread of the peace movement themes
The entry into politics
The peace movement and military strategy

AD-291 725 Div. 32
(TISTB/MS) OTS price $1.10

System Development Corp., Santa Monica, Calif.
SYSTEM DOCUMENTATION,
by N. E. Willmorth and C. J. Shaw. 1 Oct 62, 7p. (Rept. no. SP-974)
Unclassified report

DESCRIPTORS: *Documentation, *Data processing systems, Computers, Information retrieval.

The documentation problem for large, computer-based information processing systems is discussed. Although documentation needs vary with system size and complexity, and the organization of the implementation effort, the documents of such a set can be grouped according to the functions they serve: developmental, operational, modificatory, administrative. These four types are described. When a system development project is begun, the documentation requirements and the procedures necessary for efficient management control of documentation must be established and implemented immediately. Procedures for keeping the system information up to date, and providing for the efficient recovery of information, are mandatory in the dynamic system implementation situation. (Author)

33. TRANSPORTATION

AD-291 582 Div. 33, 32
(TISTB/DGH) OTS price $3.60

RAND Corp., Santa Monica, Calif.
A CONTRIBUTION TO THE URBAN TRANSPORTATION DEBATE: AN ECONOMETRIC MODEL OF URBAN RESIDENTIAL AND TRAVEL BEHAVIOR,
by John F. Kain. Nov 62, 37p. incl. illus. table (Rept. no. P-2667)
(In cooperation with Air Force Academy)
Unclassified report

DESCRIPTORS: *Transportation, *Urban areas, Economics, Mathematical analysis, Functions, Theory.

Some systematic empirical information is presented on the questions of diversion from automobile to transit and the interrelationships between urban transportation and residential land-use development. (Author)

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

*Descriptors marked with an asterisk are included in the subject index.

BIBLIOGRAPHY

TID-3568(rev. 1) $0.75

Atomic Energy Commission. Div. of Technical Information Extension, Oak Ridge, Tenn.
CRITICAL PATH SCHEDULING. A PRELIMINARY LITERATURE SEARCH, comp. by Hugh E. Voress, Elmer A. Houser, Jr., and Fred E. Marsh, Jr. July 62.

AGRICULTURE

Plant Cultivation

TID-16996 $1.60

California U., Los Angeles. School of Medicine.
MANGANESE AND MAGNESIUM AS COMPETITIVE PLANT NUTRIENTS IN SURROGATE SOILS AND SOLUTION CULTURES. Rept. on Contract AT(04-1)-GEN-12. Oct 62, 14p. 3 refs.

TID-13637 $1.10

Universita Cattolica del Sacro Cuore di Milano, Piacenza (Italy)
THE INDUCTION OF GENETIC MUTATIONS BY IRRADIATION IN PLANT SPECIES OF ECONOMIC IMPORTANCE. Progress rept. on Contract AT(30-1) 2613. 18 Sep 61, 8p.

ASTRONOMY

NASA N62-11486 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE ASTRONOMICAL UNIT DETERMINED BY RADAR REFLECTIONS FROM VENUS, by D. O. Muhleman, D. B. Holdridge and others. Rept. on Contract NAS7-100. 8 Mar 62, 18p. 19 refs. Technical rept. no. 32-221.

NASA N62-12110 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
DIFFRACTION TELESCOPE FOR ASTRONOMY IN SPACE, by Willard H. Wells. Rept. on Contract NAS7-100. 15 Apr 62, 17p. Technical rept. no. 32-230.

NASA N62-11496 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
OBSERVATIONS OF MARS MADE IN 1961 AT THE PIC DU MIDI OBSERVATORY, by J. H. Focas. Rept. on Contracts NAS7-100. 30 Jan 62, 11p. 5 refs. Technical rept. no. 32-151.

NASA N62-10675 $3.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
OBJECTIVES OF THE MARINER VENUS MICROWAVE RADIOMETER EXPERIMENT, by A. H. Barrett, J. Copeland and others. Rept. on Contract NASw-6. 22 Aug 61, 34p. 32 refs. Technical rept. no. 32-156.

NASA N62-12747 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
A STATISTICAL-MECHANICAL ESTIMATE OF ORBITAL COLLISION PROBABILITIES, by D. M. Milder. Rept. on Technical rept. no. 32-211.

NASA N62-10623 $1.10

Michigan U., Ann Arbor.
RADIO ASTRONOMY EXPERIMENTS FROM SATELLITES AND ROCKETS, by Fred T. Haddock. Quarterly status rept. 1 Aug-31 Oct 61, on Contract NASw-54. 1 Nov 61, 53p. Rept. no. 02932-8-S.

NASA N62-10622 $1.10

Michigan U., Ann Arbor.
RADIO ASTRONOMY EXPERIMENTS FROM SATELLITES AND ROCKETS, by Fred T. Haddock. Quarterly status rept. 1 May-31 July 61, on Contract NASw-54. 1 Aug 61, 5p. Rept. no. 02932-7-S.

Astrophysics

NASA N63-10796 $0.75

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
CALCULATION OF EPHEMERIDES FROM INITIAL VALUES, by Karl Stumpff. Dec 62, 28p. Technical note D-1415.

NASA N62-12446 $2.60

High Altitude Observatory, Boulder, Colo.
ANALYSIS OF THE SOLAR EMISSION SPECTRUM FROM 1300 TO 250 A AS OBSERVED IN AUGUST 1961, by H. Zirin, L. A. Hall, and others. Rept. on Grant NsG-92-60. 1962, 27p. 14 refs.

To be presented at the 3rd International Space Symposium, Washington, D. C., May 1962.

NASA N62-17030 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
RADIO LOCATION OF THE PLANET VENUS, by V. A. Kotelnikov and I. S. Shklovski. Rept. on Contract NAS7-100. 6 Mar 62, 17p. Astronautics information trans. no. 26.

Trans. of Izvestiya (USSR) 1961 [no. 132] 12 May.

NASA N62-12109 $9.10

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THERMAL HISTORY OF THE MOON AND OF THE TERRESTRIAL PLANETS: NUMERICAL RESULTS, by Zdeněk Kopal. Rept. on Contract NAS7-100. 9 Jan 62, 101p. 4 refs. Technical rept. no. 32-225.

TID-14266 $1.60

Laboratory for Nuclear Science, Mass. Inst. of Tech., Cambridge.
THE MAGNETIC FIELDS IN INTERPLANETARY SPACE AS DERIVED FROM OBSERVATIONS OF COSMIC RAY SOLAR FLARE EFFECTS, by K. G. McCracken and R. A. R. Palmeira. 13 June 61, 18p. 10 refs. Centro Brasileiro de Pesquisas Fisicas, Rio de Janeiro. Notas de Fisica Vol. VII, No. 15.

NASA N62-12465 $3.60

National Aeronautics and Space Administration, Washington, D. C.
MEASUREMENTS OF DISTRIBUTION OF INTERPLANETARY DUST, by Maurice Dubin and Curtis W. McCracken. 1962, 31p. 35 refs.

Presented at the Symposium on Small Meteoric Particles in the Earth's Neighborhood, 110th Meeting of the American Astronomical Society, Cambridge, Mass., April 2, 1962

NASA N62-10604 $3.60

Oklahoma State U. Research Foundation, Stillwater.
ANALYTICAL AND LIMITED EXPERIMENTAL STUDY OF THE MECHANISMS OF PENETRATION AND LIGHT EMISSION FOR MICROMETEORITE IMPACT OF AN ALUMINUM-COATED PHOTOMULTIPLIER, by Francis C. Todd, Shi-yu Wu and others. Quarterly progress rept. no. 3, 1 April-30 June 61, on Contract NASr-7. 1961, 34p. 17 refs.

NASA N62-11561 $4.60

Rand Corp., Santa Monica, Calif.
RADIATIVE TEMPERATURE DISTRIBUTION IN A PLANETARY ATMOSPHERE, by Neil Divine. Rept. on Contract NAS7-100. Apr 62, 51p. 16 refs. Rept. on memo RM-2958-JPL.

BEHAVIORAL SCIENCES

NASA N62-17035 $8.10

Dunlap and Associates, Inc., Stamford, Conn.
HUMAN FACTORS CRITERIA FOR THE DISPLAY OF SPACE NAVIGATION INFORMATION, by Roland C. Casperson. Final rept. on Contract NASr-64. 28 Sep 62, 83p. 63 refs.

Psychology

NASA N62-10884 $1.10

Florida State U., Tallahassee.
THE OPERATION OF THE TACTILE AND TEMPERATURE SENSES, by D. R. Kenshalo and J. P. Nafe. Rept. on Contract Nonr 1827 (00) and Grant NsG 148. Mar 62, 8p., 8 refs.

Presented at 3rd Physiological Psychology Symposium, 12-13 Mar 62, Pensacola, Florida.

PB 162 446 $1.60

Michigan U., Ann Arbor.
THE PROBLEM OF OPTIMUM GROUP ASSEMBLY, by Paul S. Dwyer. Rept. on Contract AF 18(600)1050. Jan 56, 15p. Technical note no. AFPTRC-TN-56-18; AD-124 759.

DESCRIPTORS: Aviation personnel, Personnel, *Group dynamics, *Linear programming, Mathematical prediction, Matrix algebra.

The method of reduced matrices and the approximate methods resulting from this research are applicable not only to the problem of crew assembly but also to a wide variety of problems in which a linear form is to be maximized subject to linear equations of condition.

BIOLOGICAL SCIENCES

TID-16777 $5.60

Academy of Natural Sciences of Philadelphia, Pa.
SAVANNAH RIVER BIOLOGICAL SURVEY LOWER THREE RUNS, SEPTEMBER-OCTOBER 1961. [1961] 54p.

TID-16799 $1.60

Argonne National Lab., Ill.
THE DIAGNOSIS AND CONTROL OF ECTROMELIA INFECTION OF MICE, by Robert J. Flynn. Rept. on Contract W31-109-eng-38. June 62, 16p. 1 ref.

TID-16798 $2.60

Argonne National Lab., Ill.
THE DIAGNOSIS OF ECTOPARASITISM OF MICE, by Robert J. Flynn. June 62, 22p. Rept. on Contract W31-109-eng-38.

TID-14094 $1.10

Pavia U. (Italy).
INVESTIGATIONS ON MUTABILITY OF POLYGENES AND ON UTILIZATION OF INDUCED GENETIC VARIABILITY, by R. E. Scossiroli. 1 Aug 61, 10p.

Anatomy and Physiology

PB 162 575 $2.60

Army Medical Research Lab., Fort Knox, Ky.
OBSERVATIONS ON PHYSIOLOGICAL PROBLEMS IN DESERT HEAT, TASK FORCE FURNACE, YUMA, ARIZONA, by P. J. Talso and R. W. Clarke. Rept. on High Temperatures, Physiological Effects of. 1 Apr 48, declassified 19 Jan 51. 25p. 10 refs. Rept. no. 14; AD-62 767.

DESCRIPTORS: *Deserts, *Arizona, Physiology, Heat, *Adaptation (Physiology), Perspiration, Cooling, *Metabolism, *Survival, Urine, Protective clothing, Task forces, *Heat tolerance.

An average of about 6 liters of sweat was produced daily by tank crew men and others working under the conditions encountered at Furnace. The amount of water drunk in satisfying thirst was found to be the minimum necessary to maintain water balance. This was shown by the uniformly scanty but concentrated urinary output and the fact that pitressin produced but little alteration in urine excretion. The ready availability of loose salt and salt tablets served to prevent any serious incidence of salt depletion among the personnel. Tests of chemical protective clothing by others were observed and the potential dangers of the impermeable suit were pointed out. (Author)

PB 162 413 $2.60

Columbia U. [New York].
THE RELATION OF THRESHOLD CRITERION TO THE FUNCTIONAL RECEPTORS OF THE EYE, by John L. Brown, Margaret P. Kuhns, and Helmut E. Adler. Rept. on Presentation of Data on Radar Scopes, Contract AF 33(038)22616. Aug 57, 28p. 19 refs. WADC Technical rept. 57-449; AD-130 928.

DESCRIPTORS: Vision, *Visual thresholds, Visual perception, *Photoreceptors, Visual acuity, *Light adaptation, *Dark adaptation, Luminescence, Color vision, Physiology.

Luminance thresholds for the resolution of grating test patterns were determined by the method of constant stimuli. Measurements were made for the dark adapted eye. Thresholds were determined with each of eight selected color filters and also with Wratten neutral tint filters. The gratings consisted of parallel opaque lines separated by transparent spaces, all of equal width. A series of seven gratings was used which required a range in visual acuity from 0.042 to 0.625. With gratings which demanded high visual acuity for resolution, minimum luminances for resolution of a grating were very nearly the same for all the color filters. As visual acuity requirements were decreased, however, luminance thresholds determined with the red filters became higher relative to thresholds determined with the other filters. Luminance thresholds with blue filters became lower relative to thresholds obtained with the other filters. The change in the relative threshold luminance is similar to the Purkinje shift which occurs with change in adaptation of the eye from high to low luminances.

PB 162 412 $1.60

Duke U. School of Medicine, Durham, N. C.
EFFECT OF COOLING THE CERVICAL VAGI ON THE WORK OF BREATHING, by F. G. Hall, F. W. Zechman, Jr., and John Salzano. Rept. on High Altitude Physiology, Contract AF 33(616)3821. May 58, 13p. 6 refs. WADC Technical rept. 57-699; AD-155 680.

DESCRIPTORS: *Cooling, *Vagus nerve, Respiratory system, Physiology, *Respiration, Stimulation, Brain, Adaptation (Physiology), Blood pressure, Cardiovascular system, *Neuromuscular transmission.

Cooling the cervical vagi in a series of anesthetized dogs markedly increased total respiratory work. Elastic work increase was associated with large tidal volumes while increase in viscous work was related to change in rate and duration of air flow. Blood pressure and heart rate were not appreciably affected by vagal cooling. The observations in these experiments support the suggestion of other investigators that pulmonary receptors monitor the work of breathing, permitting the medullary centers to make the most appropriate choice of depth and frequency of breathing. (Author)

PB 162 543 $8.10

Massachusetts Inst. of Tech., Cambridge.
HIGH-ENERGY METABOLITES, by S. A. Goldblith, S. A. Miller and others. Rept. for 15 June 58-31 Dec 59, on Physiology Research, Contract AF 33(616)6008. Aug 60, 83p. 36 refs. WADD Technical rept. 60-575; AD-251 901.

DESCRIPTORS: *Fatty acids, Methyl radical, *Metabolism, Energy, Instrumentation, Calorimetry, Carbohydrates, *Diet, Nutrition, Growth, Laboratory animals, Biochemistry, Synthesis, Butanols, Octanoic acids, Alkalosis, Nonyl radical.

Certain methylated fatty acids of intermediate chain length which may be oxidized in the body without producing ketosis are being investigated as high-energy dietary metabolites. A synthesis for one of these compounds, 2,4-dimethylheptanoic acid, has been planned and is being carried out. In order to facilitate accurate caloric measurement, an animal calorimeter is being constructed which will measure small changes in energy production using direct, indirect, and body balance calorimetric techniques. Moreover, the need for a simpler and more rapid means of estimating caloric density has been met by the development of a bio-assay technique. Using this technique, caloric densities of 1,3-butanediol and nonanoic acid were estimated to be 6.5 and 7.5 Cal./g., respectively. Feeding tests have indicated that 10% 1,3-butanediol or nonanoic acid may be used to replace dietary carbohydrate and to increase the caloric density of experimental high-fat rat diets. (Author)

NASA N62-10967 $2.60

Stanley Aviation Corp., Denver, Colo.
THE DYNAMIC MODEL - AN ENGINEERING APPROACH TO THE PROBLEM OF TOLERANCE TO ABRUPT ACCELERATIONS, by David J. Shapland. Rept. on Contract NASr-37. 1961, 31p. 7 refs. SAC-59.

Biochemistry

NASA N62-17565 $1.10

Bureau of Medicine and Surgery, Washington, D. C.
HEAT, DRIVING FORCE AND MEASURING SCALE OF CHEMICAL CHANGE, by T. H. Benzinger. Rept. on NASA Order R-38. [1962] 3p.

NASA N63-11002 $2.60

St. Louis U., Mo.
ABSORPTION OF D-GLUCOSE BY SEGMENTS OF INTESTINE FROM ACTIVE AND HIBERNATING, IRRADIATED AND NON-IRRADIATED GROUND SQUIRRELS, CITELLUS TRIDECEMLINEATUS, by X. J. Musacchia and D. D. Westhoff. Rept. on Grant NsG-271-62. [1962], 29p. 18 refs.

TID-16842 $3.60

Western Reserve U., Cleveland, Ohio.
INTERMEDIARY METABOLISM OF CARBOHYDRATES AND RELATED SUBSTANCES. Terminal rept. on Contract AT(30-1)-1050. 1 Sep 62, 38p. 91 refs.

Botany

NASA N63-11194 $1.60

Maryland U., College Park.
CARBON DIOXIDE AND BICARBONATE IN CELL DIVISION, by Constantine Sorokin. Rept. on Grant NsG-70-60. [1962] 18p. 14 refs.

NASA N63-11193 $2.60

Maryland U., College Park.
ENDOGENOUS METABOLISM IN ALGAE, by Robert W. Krauss and Raymond A. Galloway. Rept. on Contract Nonr-3916(00) and Grant NsG-70-60. [1962], 22p. 24 refs.

NASA N63-11195 $3.60

Maryland U., College Park.
THE SYNTHESIS OF STEROLS AND THE EFFECT OF STEROIDS IN CHLORELLA, by Glenn W. Patterson. Master's thesis. Rept. on Grant NsG-70-60. [1963] 36p. 37 refs.

Medical Specialties and Equipment

PB 162 452 $9.10

Dental Research [Facility] Naval Training Center, Great Lakes, Ill.
SURVEY OF DENTAL HEALTH OF THE NAVAL RECRUIT. I. STATUS OF DENTAL HEALTH, by G. H. Rovelstad, R. P. Irons and others. Vol. 3, p. 1-110. 30 Dec 57, 110p. 39 refs. Research rept.
NM 75 01 26.04.02.

DESCRIPTORS: Dental research, Physical fitness, *Naval personnel, Teeth, *Dental caries, Dentistry, *Mouth hygiene, *Gingivitis, Diseases.

Naval recruits (2027) were examined and subjected to questionnaires and tests upon arrival at the U. S. Naval Training Center, Bainbridge, Maryland between July and December 1956 before receiving any dental instruction or dental care. The results of these examinations and the data collected are summarized and presented as typical data describing the young male adult as he presents for military service from the Eastern one-third of the United States. Base line data is recorded for future studies designed to evaluate factors influencing the state of dental health of the young male adult prior to military service. The average young male adult of this survey (age 18.5 years) was found to have 26.7 teeth present. The average DMF per recruit was 13.9, missing teeth (lost by disease or trauma) 2.4, carious teeth 7.2, restored teeth 6.1, teeth to be extracted 1.5, carious surfaces 12.9 and restored surfaces 10.1. Seventy-nine per cent of the group had a recognizable gingivitis at time of the examination. (Author)

PB 162 453 $1.60

Dental Research [Facility] Naval Training Center, [Great Lakes, Ill]
SURVEY OF DENTAL HEALTH OF THE NAVAL RECRUIT. II: SURVEY OF DENTAL TREATMENT, by R. P. Irons, O. S. Levitz, and G. H. Rovelstad. Vol. 3, p. 161-177. 1 May 58, 17p. 1 ref. Research rept.
NM 75 01 26.04.03.

DESCRIPTORS: Dentistry, *Dental caries, *Naval personnel, Teeth, Therapy, Dental personnel, *Job analysis.

The dental treatment provided for naval recruits by dental officers on duty at the U. S. Naval Training Center, Bainbridge, Maryland has been summarized and evaluated in terms of the daily capabilities for dental officers for rendering the treatment. It has been shown that the actual treatment as provided by one officer per day for each of the types of treatment classified is as follows: 9.2 operative restorations, 38.4 extractions, 2.6 prosthetic restorations and 10.2 periodontal treatments. This was the long term average of treatment provided during a time of maximum availability of all treatment classes and adequate support by auxiliary personnel for assistance and laboratory procedures, (Author) See also PB 162 452
(Biological Sciences--Medical Specialties, 20 Mar 63)

PB 162 454 $2.60

Dental Research [Facility] Naval Training Center [Great Lakes, Ill.]
SURVEY OF DENTAL HEALTH OF THE NAVAL RECRUIT. III. RELATION OF TOOTH BRUSHING HABITS TO STATE OF DENTAL HEALTH, by G. H. Rovelstad and R. C. Hackman. Vol. 3, p. 246-267. 2 June 58, 22p. 2 refs. Research rept. NM 75 01 26.04.04.

DESCRIPTORS: Dentistry, *Naval personnel, Teeth, *Mouth hygiene, Education, *Dental caries, *Gingivitis, Diseases.

The tooth brushing habits of 2027 young male adults as recorded in a questionnaire at U. S. Naval Training Center, Bainbridge were evaluated in relation to a series of different factors of dental health. It is noted that the total rate of dental caries as revealed by the number of DMF teeth shows little relationship to the frequency of tooth brushing. On the other hand evidence of neglect as revealed by the number of carious teeth, pulp exposures teeth to be extracted and poor oral hygiene shows a definite relationship. Particularly high correlation was noted to the number of restored teeth. (Author) See alsc PB 162 453.

PB 162 455 $3.60

Dental Research [Facility] Naval Training Center [Great Lakes, Ill.]
SURVEY OF DENTAL HEALTH OF THE NAVAL RECRUIT. IV: RELATION OF THE FREQUENCY AND REGULARITY OF DENTAL VISITS TO THE STATE OF DENTAL HEALTH, by G. H. Rovelstad and R. B. Wolcott. Vol. 3, p. 285-319. 28 Aug 58, 35p. 2 refs. Research rept. NM 75 01 26.04.05.

DESCRIPTORS: Dentistry, *Naval personnel, *Mouth hygiene, *Dental caries, *Gingivitis, Teeth, Therapy, Diseases.

The frequency and regularity with which professional dental care has been sought by 2027 young male adults as recorded in a questionnaire at the U. S. Naval Training Center were evaluated in relation to a series of different factors of dental health. It is noted that the total rate of dental caries as revealed by the number of DMF teeth is higher for those who most frequently went to the dentist, as is the average number of restored teeth and restored surfaces. On the other hand the average number of carious teeth, carious surfaces and teeth to be extracted is higher for those who rarely sought dental attention. It is also noted that there is a better state of gingival health for those who sought regular dental care. (Author) See also: PB 162 454

PB 162 456 $1.60

Dental Research [Facility] Naval Training Center [Great Lakes, Ill.]
SURVEY OF DENTAL HEALTH OF THE NAVAL RECRUIT. V. RELATION OF THE AGE OF THE RECRUIT TO THE STATE OF DENTAL HEALTH, by G. H. Rovelstad and R. B. Wolcott. Vol. 3, p. 320-339. 15 Sep 58, 20p. 2 refs. Research rept. NM 75 01 26.04.06.

DESCRIPTORS: Dentistry, *Naval personnel, *Mouth hygiene, *Dental caries, Age factors, Gingivitis, Teeth, Diseases.

The ages of 2027 young male adults as recorded in a questionnaire at the U. S. Naval Training Center, Bainbridge, Maryland were evaluated in relation to a series of different factors of dental health. Although it appears that the total rate of dental caries, as measured by the number of DMF teeth, changes very little with an increase in age there is evidence that dental care has improved the dental condition. There are less carious teeth, depth of cavities and teeth to be extracted. Accordingly, there are more restored teeth, missing teeth and an improvement in oral hygiene, restored teeth, missing teeth and an improvement in oral hygiene, gingival health and dental esthetics. Good correlation is noted to the number of carious teeth and surfaces and number of restored teeth and surfaces. (Author) (See also PB 162 455)

PB 162 457 $2.60

Dental Research [Facility] Naval Training Center [Great Lakes, Ill.]
SURVEY OF DENTAL HEALTH OF THE NAVAL RECRUIT. VI. RELATION OF PLACE OF BIRTH TO STATE OF DENTAL HEALTH, by G. H. Rovelstad and R. B. Wolcott. Vol. 3, p 340-361. 30 Sep 58, 22p. 2 refs. Research rept. NM 75 01 26.04.07.

DESCRIPTORS: Dentistry, *Naval personnel, Geography, *Mouth hygiene, *Dental caries, Diseases, Teeth,

The birthplace of 2027 young male adults as recorded in a questionnaire at the U. S. Naval Training Center, Bainbridge were evaluated in relation to a series of different factors of dental health. It is noted that the total rate of dental caries as revealed by the number of DMF teeth varies according to the region of birth of the individual. In addition, the amount and type of professional dental care received by the individual recruit varies with the region of origin of the recruit. (Author) (See also PB 162 456)

PB 162 458 $1.60

Dental Research [Facility] Naval Training Center [Great Lakes, Ill.]
SURVEY OF DENTAL HEALTH OF THE NAVAL RECRUIT. VII. RELATIONSHIP OF THE SCORE ON THE GENERAL CLASSIFICATION TEST TO THE STATE OF DENTAL HEALTH, by G. H. Rovelstad and R. B. Wolcott. Vol. 3, p. 362-382. 15 Oct 58, 20p. 2 refs. Research rept. NM 75 01 26.04.08.

DESCRIPTORS: Dentistry, *Naval personnel, *Mouth hygiene, *Dental caries, Teeth, Gingivitis, *Intelligence tests, Diseases.

The General Classification Test score, as attained by the recruit during his processing period at the U. S. Naval Training Center, Bainbridge was recorded for 2027 recruits and evaluated for its relation to a series of different factors of dental health. It is apparent that the total rate of dental disease, as measured by the

number of DMF teeth, is relatively constant for each group of GCT scores. However, evidence of neglect of the teeth as measured by the number of carious teeth, depth of cavities, teeth to be extracted and poor oral hygiene shows a definite relationship. Good correlation also exists between the score of the GCT test and factors which reflect care given the teeth, such as fewer missing teeth and more restored teeth. (Author) (See also PB 162 457)

PB 162 459 $1.60

Dental Research [Facility] Naval Training Center [Great Lakes, Ill.]
SURVEY OF DENTAL HEALTH OF THE NAVAL RECRUIT. VIII. RELATION OF FORMAL EDUCATION TO THE STATE OF DENTAL HEALTH OF THE RECRUIT, by G. H. Rovelstad and R. B. Wolcott. Vol. 3, p. 383-402. 15 Oct 58, 20p. 2 refs. Research rept. NM 75 01 26.04.09.

DESCRIPTORS: Dentistry, *Naval personnel, *Mouth hygiene, *Education, *Dental caries, Gingivitis, Teeth, Diseases.

The years of formal education, acquired by 2027 naval recruits reporting for duty at the U. S. Naval Training Center, Bainbridge, were evaluated for their relation to a group of factors of dental health. The rate of dental disease, as measured by the number of DMF teeth, is somewhat greater in the groups of recruits with more education. Those with less formal training demonstrated more neglect of their teeth, as measured by the number of carious teeth, depth of cavities and number of teeth to be extracted. In contrast, those with more formal training received more restorative care and demonstrated better health of their soft tissues. (Author) (See also PB 162 458)

PB 162 460 $2.60

Dental Research [Facility] Naval Training Center [Great Lakes, Ill.]
SURVEY OF DENTAL HEALTH OF THE NAVAL RECRUIT. RELATION OF FATHER'S OCCUPATION TO THE STATE OF DENTAL HEALTH, by G. H. Rovelstad and R. B. Wolcott. Vol. 3, p. 403-423. 24 Oct 58, 21p. 2 refs. Research rept. NM 75 01 26.04-10.

DESCRIPTORS: Dentistry, *Naval personnel, *Mouth hygiene, *Dental caries, Gingivitis, Rearing, Economics, *Culture, Teeth, Diseases.

The occupations of the fathers of 2027 young male adults as recorded in a questionnaire at the U. S. Naval Training Center, Bainbridge, were evaluated in relation to a series of different factors of dental health. It is noted that the rate of dental caries in the recruit, as measured by the number of DMF teeth, shows little relationship to the occupation of the father. There is a sharp increase in the neglect of the teeth, as reflected by number of carious teeth and teeth to be extracted, among those whose fathers' occupations were classified in the lower skilled groups. Restorative care, oral hygiene, gingival health and dental esthetics was greater among those groups whose fathers have more skillful and higher trained occupations. (Author) (See also PB 162 459)

PB 162 461 $1.60

Dental Research [Facility] Naval Training Center [Great Lakes, Ill.]
SURVEY OF DENTAL HEALTH OF THE NAVAL RECRUIT. X. RELATION OF THE FATHER'S INCOME TO THE STATE OF DENTAL HEALTH, by G. H. Rovelstad and R. B. Wolcott. Vol. 3, p. 424-443. 30 Oct 58, 20p. 2 refs. Research rept. NM 75 01 26.04.11.

DESCRIPTORS: Dentistry, *Naval personnel, *Mouth hygiene, *Dental caries, Ginginitis, Rearing, Economics, Culture, *Wages, Teeth, Diseases.

The income of their fathers, as recorded by 2027 naval recruits reporting for duty at the U. S. Naval Training Center, Bainbridge, was evaluated for its relation to a group of factors of dental health. With each class of higher income there was noted a higher DMF rate, fewer carious teeth and fewer teeth to be extracted. There was noted to be increased health of soft tissues and dental esthetics among those recruits whose fathers were classed in higher groups. Good correlation of the fathers' income to dental health factors which reflect professional dental care. (Author) (See also PB 162 460)

PB 162 462 $3.60

Dental Research [Facility] Naval Training Center [Great Lakes, Ill.]
SURVEY OF DENTAL HEALTH OF THE NAVAL RECRUIT. XI. RELATION OF THE FORMAL EDUCATION OF THE RECRUIT'S FATHER AND MOTHER TO THE STATE OF DENTAL HEALTH, by G. H. Rovelstad and R. B. Wolcott. Vol. 3, p. 444-478. 15 Nov 58, 35p. 2 refs. Research rept. NM 75 01 26.04.12.

DESCRIPTORS: Dentistry, *Naval personnel, *Mouth hygiene, *Dental caries, Gingivitis, *Rearing, *Education, Culture, Teeth, Diseases.

The relationship of the amount of formal education of the fathers and mothers of naval recruits has been evaluated in relation to the state of dental health of the recruit. Various factors of dental health have been used to evaluate the recruit including the number of DMF teeth, carious teeth, carious surfaces, restored teeth, restored surfaces, missing teeth, teeth to be extracted, oral hygiene, gingival health and dental esthetics. Neglect of the teeth as measured by the number of carious teeth and number of teeth to be extracted is much greater in the group of recruits whose parents had the least education. Those recruits whose parents had high school educations or better had the least need for dental care at the time of entrance to the Receiving Center. Those of the higher parent educational backgrounds also had the best oral hygiene and gingival health. More dental care was evident in the recruits whose parents had the higher levels of education. (Author) (See also PB 162 461)

PB 162 463 $1.60

Dental Research [Facility] Naval Training Center [Great Lakes, Ill.]
SURVEY OF DENTAL HEALTH OF THE NAVAL RECRUIT. XII. RELATION OF BROTHERS AND SISTERS TO THE STATE OF DENTAL HEALTH, by G. H. Rovelstad and R. B. Wolcott. Vol. 3, p. 478-499. 30 Nov 58, 20p. 2 refs. Research rept. NM 75 01 26.04.13.

DESCRIPTORS: Dentistry, *Naval personnel, *Mouth hygiene, *Dental caries, Gingivitis, *Rearing, Economics, Teeth, Diseases.

The number of brothers and sisters, as recorded by 2027 naval recruits reporting for duty at the U. S. Naval Training Center, Bainbridge, was evaluated for its relation to a group of factors of dental health. Although the rate of dental disease, as measured by the number of DMF teeth, remains fairly constant regardless of family size there is an increase in the number of carious teeth, teeth to be extracted and in the depth of cavities among the groups with more brothers and sisters. In contrast, recruits with fewer brothers and sisters reveal more restorative dentistry and better health of the soft tissues, oral hygiene and dental esthetics. (Author) (See also PB 162 462)

PB 162 464 $2.60

Dental Research [Facility] Naval Training Center [Great Lakes, Ill.]
SURVEY OF DENTAL HEALTH OF THE NAVAL RECRUIT. XIII. RELATION OF OPINIONS TOWARDS DENTISTRY TO THE STATE OF DENTAL HEALTH, by G. H. Rovelstad and R. B. Wolcott. Vol. 3, p. 500-520. 15 Dec 58, 21p. 3 refs. Research rept. NM 75 01 26.04.14.

DESCRIPTORS: Dentistry, *Naval personnel, *Mouth hygiene, *Dental caries, Gingivitis, *Education, *Culture, Rearing, Teeth, Diseases.

The regard for dentistry and dental care held by 2027 naval recruits reporting for duty at the U. S. Naval Training Center, Bainbridge was obtained from an "opinion questionnaire" and related to a group of factors of dental health. The rate of dental disease, as measured by the number of DMF teeth, is considerably higher among those who have unfavorable opinions toward dentistry. Similarly, the same individuals have displayed greater dental neglect in the form of carious teeth, depth of cavities, teeth to be extracted and health of the soft tissues. Those with favorable opinions of dentistry received more dental care, as evidenced by the number of restored teeth. Excellent correlation exists with the number of unfavorable opinions to the number of teeth to be extracted. (Author) (See also PB 162 463)

Microbiology

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Clemson Agricultural Coll., S. C.
OVERWINTERING OF XANTHOMONAS PRUNI, THE CAUSAL ORGANISM OF BACTERIAL SPOT OF PEACHES, by John B. Whitney, Jr. and Harold H. Foster. Final rept. on Contract AT(40-1)1762. 12 Oct 62, 19p. 25 refs.

NASA N62 17032 $1.60

Space Sciences Lab., U. of California, Berkeley.
DETECTION AND STUDY OF MICROORGANISMS IN THE UPPER ATMOSPHERE, ed. by Robert C. Spear. Final rept. on Grant NsG-104-61. 20 Aug 62, 19p. 6 refs. Series no. 3, issue no. 14.

TID-16970 $3.60

Syracuse U., N. Y.
PRODUCTION AND STUDY OF ASPOROGENIC MUTANTS OF BACILLUS CEREUS, by Donald G. Lundgren. Annual rept. 1 June-31 Dec 62, on Contract AT(30-1)-2038. 18 Oct 62, 37p. 28 refs.

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Argonne National Lab., Ill.
CHARACTERISTICS OF MAMMALIAN CELL POPULATIONS SURVIVING HIGH DOSES OF X IRRADIATION IN VITRO, by Warren K. Sinclair. Rept. on Contract W31-109-eng-38. June 62, 24p. 11 refs.

TID-16742 $1.60

Argonne National Lab., Ill.
EVIDENCE SUGGESTING PROTECTION AGAINST "DIRECT" ACTION OF X-RAYS IN THE BACTERIAL SPORE, by R. B. Webb and E. L. Powers. Rept. on Contract [W31-109-eng-38.] [June 62,] 16p. 15 refs. UAC-6499.

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RADIATION-INDUCED CHROMOSOMAL ABERATIONS AND VARIANT CLONES IN MAMMALIAN CELLS CULTIVATED IN VITRO, by Agnes N. Stroud, Austin M. Brues, and Beverly M. Svoboda. Rept. on Contract W31-109-eng-38. June 62, 28p. 26 refs.

TID-16763 $1.60

Argonne National Lab., Ill.
X-RADIATION RESPONSE OF AUXIN FORMATION BY ANIMAL TISSUE, by S. A. Gordon and E. Buess. Rept. on Contract W31-109-eng-38. June 62, 18p. 15 refs.

BNL-6297 $2.60

Brookhaven National Lab., Upton, N. Y.
KINETICS OF ERYTHROCYTIC PRECURSOR PROLIFERATION IN DOG, by N. Odartchenko, V. P. Bond and others. 23 Oct 62, 21p. 5 refs.

TID-16835 $1.60

California U., Los Angeles. School of Medicine.
UPTAKE OF RADIOACTIVE MATERIALS FROM A NUCLEAR REACTOR BY SMALL MAMMALS AT THE NEVADA TEST SITE, by Frederick B. Turner, Page Hayden and others. Rept. on Contract AT(04-1)-GEN-12. Sep 62, 13p. 8 refs.

TID-16765 $5.60

Institute of Industrial Medicine, New York U. Medical Center, N. Y.
DOSIMETRIC ASPECTS OF RADIUM POISONING, by Henry Petrow and Merril Eisenbud. Annual rept. on Contract AT(30-1)-2896. 31 Aug 62, 54p.

TID-16537 $1.10

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TRANSPLANTATION OF PRESERVED MARROW BETWEEN ANIMALS AND FROM ONE HUMAN BEING INTO ANOTHER, by L. M. Tocantins and Julios Iossifides. Rept. for 1 Aug 61-31 July 62, on Contract AT(30-1)1982. 4p.

TID-13959 $1.60

Pavia U. (Italy).
INVESTIGATIONS ON MUTABILITY OF POLYGENES, by R. E. Scossiroli. Rept. on Contract AT(30-1)2686. 1 Oct 61, 14p.

TID-16979 $1.60

Pavia U. (Italy).
INVESTIGATIONS ON MUTABILITY OF POLYGENES AND ON UTILIZATION OF INDUCED GENETIC VARIABILITY, by R. E. Scossiroli. Rept. on Contract IAEA/US. 1 Aug 62, 15p.

TID-16776 $1.60

Roscoe B. Jackson Memorial Lab., Bar Harbor, Maine
RATE OF RECOVERY FROM RADIATION INJURY AND ITS RELATIONSHIP TO AFTER EXPECTATION OF LIFE IN MICE. Progress rept. 1 Jan-7 Sep 62, on Contract AT(30-1)-2313. 7 Sep 62, 13p.

TID-16447 $1.60

Trieste U., (Italy).
STUDY AND COMPARISON BETWEEN NECROLYTIC AND RADIOLYTIC LESIONS AT THE MITOCHONDRIA LEVEL (LYSOSOMES) IN ASEPTICAL PERFUSED BEEF HEART MUSCLE. Progress rept. no. 1, [1962]. 20p.

TID-16446 $2.60

Trieste U. (Italy)
STUDY AND COMPARISON BETWEEN NECROLYTIC AND RADIOLYTIC LESIONS AT THE MITOCHONDRIAL LEVEL (LYSOSOMES) IN ASEPTICAL PERFUSED HEART MUSCLE. Rept. for 1 Oct 60-1 Oct 61, 20 Aug 62, 21p.

TID-16428 $1.10

Turku U. (Finland).
MUTATION RATES AT SPECIFIC AUTOSOMAL LOCI IN DROSOPHILA SPECIES, by Aloha Hannah-Alava. Rept. Nov 60-Apr 61. Supplementary rept. for Mar-Apr 61. 11 May 61, 7p.

TID-16429 $1.10

Turku U. (Finland)
MUTATION RATES AT SPECIFIC LOCI IN DROSOPHILA MELANOGASTER, by Aloha Hannah-Alava. Final rept. for 1 Nov 60-31 Oct 61, 12 Dec 61, 7p.

TID-17013 $1.10

Western Reserve U., Cleveland, Ohio.
INSENSITIVITY TO IONIZING RADIATION OF DNA-POLYMERASE IN A SLIME MOLD, by Oddvar F. Nygaard. [1961] 10p. 6 refs.

CHEMISTRY

NYO-10143 $1.10

Air Reduction Co., Inc., Murray Hill, N. J.
RESEARCH ON APPLICATIONS OF KRYPTON 85, by W. G. Marancik and P. S. Minetti. Quarterly progress rept. no. 3, 1 Apr-30 June 62, on Contract AT(30-1)-2906. 23 Nov 62, 10p. 1 ref.

IS-557 $6.60

Ames Lab., Iowa State U. of Science and Tech.
ACID-BASE REACTIONS AND KINETICS OF THE HALATES IN FUSED NITRATES, by James Max Schlegel and F. R. Duke. Rept. on Contract W-7405-eng-82. Nov 62, 69p. 35 refs.

BMI-X-10019 $1.60

Battelle Memorial Inst., Columbus, Ohio.
DEVELOPMENT OF URANIUM MONONITRIDE, by Donald L. Keller. Quarterly progress rept. July-Sep 62, on Contract W7405-eng-92. 1 Oct 62, 12p.

BMI-X-10021 $1.60

Battelle Memorial Inst., Columbus, Ohio.
RADIOISOTOPE AND RADIATION APPLICATIONS, ed. by Duane N. Sunderman. Quarterly progress rept. on Contract W-7405-eng-92. 18 Oct 62, 16p. 1 ref.

PB 171 980 $1.75

Bureau of Mines, Washington, D. C.
DEVELOPMENT OF DEPELETED-URANIUM CATALYSTS FOR DESTRUCTION OF AIR POLLUTANTS IN AUTOMOBILE EXHAUST. Fiscal year 1961 rept. of research progress. [1961] 62p. 3 refs.

DESCRIPTORS: *Atmospheric pollution, Decontamination, Internal combustion engines, *Exhaust gases, Hydrocarbons, Carbon compounds, Monoxides, Oxidation, *Catalysts, *Uranium, Copper compounds, Chromium compounds, Aluminum compounds, Oxides, Laboratories, Mobile, *Vehicle accessories, Exhaust systems, Reactors.

Investigations indicated that copper-chromium-promoted, depleted uranium catalyst on alumina support showed promising activity for oxidizing hydrocarbons and carbon monoxide normally present in motor vehicle exhaust. However, copper and chromium oxides combined on alumina supports are effective oxidizing agents, too. The investigations did not establish unequivocally that depleted uranium oxide exhibited positive catalytic oxidation activity in the presence of oxides of copper and chromium. A series of comparative tests were made that established that depleted uranium oxide exhibited an oxidizing role over and above that of the other catalytic agents present in uranium-catalyst mixtures promoted by copper oxide and/or chromium oxide. Data on the series of tests is presented.

NASA N62-11502 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
A METHOD FOR DETERMINING RELATIVE HUMIDITY IN STERILIZING GAS MIXTURE CONTAINING ETHYLENE OXIDE, FREON 12, AND AIR, by Stephen P. Vango and John B. Krasinsky. Rept. on Contract NAS7-100. 1 Mar 62, 19p. 5 refs. Technical rept. no. 32-218.

NASA N63-11619 $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
THE USE OF AN IONIZATION GAGE AS A QUANTITATIVE ANALYZER FOR BI-GASEOUS MIXTURES, by Leonard T. Melfi, Jr. and George M. Wood, Jr. Dec 62, 12p. 4 refs. Technical note D-1597.

Analytical Chemistry

NASA N62-12274 $1.60

General Electric Co., Cincinnati, Ohio.
RESEARCH ON ANALYTICAL METHODS FOR OXYGEN IN LIQUID ALKALI METALS, by Hyman Kirtchik and George Riechmann. Quarterly progress rept. no. 4, 1 Oct-31 Dec 61, on Contract NASr-12. 15 Jan 62, 16p. 19 refs. DM-62-31.

PB 162 598 $1.10

Pennsylvania State [U. Coll.] of Mineral Industries [University Park].
DIFFERENTIAL THERMAL ANALYSIS OF SOME METAL HYDROXIDES, by Dorothy P. Enright. O.N.R. Technical rept. no. 41 on Contract N6onr-269, T.O. 8. Apr 52, 6p. 2 refs. ATI-159 362.

DESCRIPTORS: *Thermochemistry, Chemical analysis, *Metals, Silicon, Germanium, Titanium, Tin, Thorium, Magnesium, Calcium, Strontium, Zinc, Cadmium, Aluminum, Gallium, Nickel, Iron, Chromium, *Hydroxides, *Dehydration, Heating.

The data obtained for fifteen metal hydroxides are presented. The endothermic and exothermic heat effects are plotted as a function of the temperature at which they occur.

Organic Chemistry

NASA N62-12746 $1.10

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE POSSIBILITY OF STRAIN DEPENDENCE IN THE THERMAL DEGRADATION PROCESSES OF VINYL POLYMERS, by Robert G. Nagler. Rept. on Contract NAS7-100. 2 Jan 62, 10p. 8 refs. Technical rept. no. 32-202.

UCRL-6714 $1.60

Lawrence Radiation Lab., U. of California, Livermore.
A PREPARATION OF PRIMARY PERFLUOROALKYL AMINES, by Richard K. Pearson, Richard D. Dresdner. Rept. on Contract W-7405-eng-48. 6 Dec 61, 14p. 14 refs.

Physical Chemistry

BNL-753(T-278) $0.50

Brookhaven National Lab., Upton, N. Y.
RADIATION PROCESSING. COBALT-60 GAMMA IRRADIATION OF URANIUM AND HYDROCARBONS, by Peter Colombo and Meyer Steinberg. Aug 62, 18p. 8 refs. Rept. no. 5.

PB 162 605 $1.60

Kentucky Research Foundation, Lexington.
A STUDY OF CONDUCTING SOLUTIONS AT LOW TEMPERATURES, by Lyle R. Dawson and Paul G. Sears. Final rept. on Contract DA 36-039-sc-42581. 20 June 55, 12p. 21 refs. AD-67 695.

DESCRIPTORS: *Electrochemistry, *Electrolytes, *Potassium compounds, *Sodium compounds, *Ammonium compounds, Bromides, Iodides, Cyanides, Metals, Hydroxides, Carbonates, Solutions, Electrical conductance, Viscosity, Density, Low temperature research.

Conductances, viscosities, and densities of solutions of KI, KBr, and NaBr in several mixtures of isomeric dimethylformamide and N-methylacetamide were measured at 20° to 50°C for concentrations from 0.0001 to 2N. The conductance of KCl in 8 approximately isoviscous mixtures of N-methylacetamide and tertiary BuOH was measured at 30°C for concentrations from 0.0001 to 0.01N. Conductances, viscosities, and densities were determined for solutions of KSCN in MeOH at 9 temperatures from 25° to -50°C. Concentrations of KSCN varied from 0.0004 to 1.75N. The viscosities and densities of several MeOH-Me_2CO mixtures were measured at 10° intervals between -50° and 20°C. The conductances of several samples of quaternary NH_4Br and NH_4I in dimethylformamide were measured at 25°C. The conductances of trimethylphenyl ammonium chloride and iodide in H_2O and in dimethylformamide were measured at 25°C. Solute concentrations ranged from 0.6 to 30×10^{-4} N. Limiting equivalent conductances and dissociation constants were evaluated for the salts by the Shedlovksy extrapolation method. The conductances of concentrated solutions of magnesium acetate tetrahydrate and magnesium nitrate hexahydrate in MeOH were determined at 10° intervals between -50° and 20°C. Conductances of KSCN and tetrabutyl ammonium iodide in Me_2CO were measured at 25°C and at 10° intervals between -50° and 20°C.

UCRL-10448 $1.50

Lawrence Radiation Lab., U. of California, Berkeley.
ENERGY MATRICES OF THE f^5 ELECTRON CONFIGURATION, by B. G. Wybourne. Rept. on Contract W7405-eng-48. Sep 62, 57p. 8 refs.

UCRL-6679 $1.10

Lawrence Radiation Lab., U. of California, Livermore.
RATES OF HYDROGEN ADSORPTION ON SOLIDIFIED GAS FILMS, by Angus L. Hunt, Clyde E. Taylor, and John E. Omohundro. Rept. on Contract W-7405-eng-48. 3 Nov 61, 6p. 6 refs.

PB 162 611 $7.60

Metals Processing Lab., Mass. Inst. of Tech., Cambridge.
INVESTIGATION OF THE KINETICS AND MECHANISM INVOLVED IN THE HYDROGEN REDUCTION OF METAL HALIDE VAPORS, by H. S. Spacil and J. Wulff. Final rept. on Contract DA 19-020-ORD-3760 31 Jan 58, 74p. 12 refs. DSR Project 7455; AD-156 957.

DESCRIPTORS: *Metals, Halides, *Molybdenum, Chlorides, Reduction (Chemistry), Hydrogen, Reaction kinetics, *Vapor plating, Thickness, Gas flow.

A flow system was built and operated for the purpose of studying the mechanism of the reduction of $MoCl_5$ vapor to a solid metal plate with a large excess of H_2. By means of a simplified theory describing static and flow system reduction, it is shown on theoretical grounds that the thickness of reduced metal deposited should be a function of the parameter x/u, where x is distance along the reaction chamber of the flow system and u is the average velocity of gas flow through the reaction chamber. Approximate alternative expressions for the thickness variation as a function of x/u are derived for two possible extreme cases, and the data obtained from several experimental runs is plotted in normalized form to show that only one of these expressions applies to the $MoCl_5$ reduction. The data can be both qualitatively and quantitatively interpreted as showing that the reduction to metal is limited by the diffusion of some gaseous constituent through the gas mixture in the reduction chamber. The effect of the nature of gaseous diffusion of one species through another upon the reduction is discussed. (Author)

EARTH SCIENCES

NASA N62-12152 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
MASS SPECTROMETRIC STUDY OF THE LEAD IN CARBONACEOUS CHONDRITES, by Royal R. Marshall. Rept. on Contract NAS7-100. 19 Mar 62, 19p. 39 refs. Technical rept. no. 32-216.

TID-17302 $5.60

Lamont Geological Observatory, Columbia U., Palisades, N. Y.
STUDIES ON THE DEEP CIRCULATION IN THE ANTILLEAN-CARIBBEAN BASINS, by Georg Wust. Rept. on Contract AT(30-1)2663. Oct 62, 49p. 28 refs. Technical rept. no. CU-1-62.

NASA N63-10505 $3.60

Rand Corp., Santa Monica, Calif.
THE ADIABATIC INTEGRAL INVARIANT IN THE GEOMAGNETIC FIELD, by E. C. Ray, E. H. Vestine and others. Rept. on Contract NASr-21(05). Oct 62, 38p. 7 refs. Memo no. 3347-NASA.

NASA N63-10318 $1.60

Rand Corp., Santa Monica, Calif.
DIFFERENTIAL EQUATIONS FOR GEOMAGNETIC FIELD LINES IN SPACE, by W. L. Sibley. Rept. on Contract NASr-21(05). Oct 62, 20p. 6 refs. Memo no. RM-3353-NASA.

UCRL-6261 $2.60

Lawrence Radiation Lab., U., of California Livermore.
A HEURISTIC STUDY OF TWO METHODS OF TIME INTEGRATION, by Joseph B. Knox. Rept. on Contract W-7405-eng-48. 20 Dec 60, 26p. 14 refs.

PB 161 995-3 $3.00

Office of Naval Operations, Washington, D. C.
UPPER WIND STATISTICS CHARTS OF THE NORTHERN HEMISPHERE (50 mb LEVEL, PROVISIONAL) by Harold L. Crutcher and Morton H. Bailey. Mar 62, 155p. 35 refs. NAVWEPS 50-1C-535, Volume III. (Weather Bureau).

DESCRIPTORS: *Upper atmosphere, *Air mass analysis, *Wind, Distribution, Statistical analysis, *Meteorological charts, Weather stations, Meteorological parameters, Vector analysis, Nomograms, Probability

The use and need of upper air data for varied types of planning have increased rapidly in the last two decades. The effect of upper winds is noted in many military and civil activities. Upper winds play an improtant part in payload and endurance characteristics of heavier-than-air craft. Air pollution, radioactive "fallout." operation of lighter-than-air vehicles, movement of weather systems and problems of the missile age are intimately associated with wind in the earth's atmosphere. The present publication is one of a series presenting a cartographic analysis of the data given in Weather Bureau Technical Paper No. 34 supplemented by additional data prepared specifically for this series. (See also PB 161 995-2)

PB 162 607 $9.60

United Research, Inc., Cambridge, Mass.
MEASUREMENT OF WIND SHEAR, by Sidney Lees and E. E. Larrabee. Quarterly rept. no. 3, 1 Jan-31 May 59, on Structural Studies and Component Development, Contract DA 36-039-sc-75064. 31 May 59 120p. 2 refs. AD-225 954.

DESCRIPTORS: *Wind, Velocity, *Shear stresses, Measurement, Aerodynamics, Structures, Azimuth, Accelerometers, Radiosondes, Parachutes, Data processing systems, Telemetering data, Honeycomb cores, Aluminum, Sandwich construction.

Continuation is reported on the wind shear measuring system development program. Work is about 50% complete. Major effort is in structural studies, particularly supplementary elements, as leading edges and struts. Proposed structure is to be made of aluminum honeycomb and aluminum skin with plastic struts, leading edges and nose section. Numerical evaluation of imperfectly tuned wind shear probe performance shows it to be suitable for all altitudes up to 100,000 ft. The results of the first uninstrumented drops were evaluated and presented. Further details of the components and telemetering scheme are developed. It was decided to employ pulse duration modulation as the telemetering technique. (Author)

PB 162 574 $1.10

[Air Weather Service, Scott AFB, Ill.].
A STUDY ON FORECASTING THE VISIBILITY WHEN ICE FOG IS PRESENT AT LADD A.F.B. ALASKA, by Merlin J. Van Dunk. [1959] 5p. AD-226 509.

DESCRIPTORS: *Weather forecasting, *Ice fog, *Visibility, Aircraft, Meteorology, Alaska.

PB 162 613 $3.60

American Power Jet Co., Ridgefield, N. J.
EVALUATION OF NORTHERN HEMISPHERE ICING PROBABILITIES, by Robert W. Jailer. Rept. on Operations Analysis of Icing Problems, Contract AF 33(616) AF 33(616)2605. June 55, 33p. 43 refs. WADC Technical note 55-225; AD-76 875.

DESCRIPTORS: Aircraft, *Ice, *Probability, Meteorological data, *Ice charts, Navigation charts, Low altitude, Northern Hemisphere.

Data from a U. S. Weather Bureau study of the frequency distribution of low pressure centers, published upper air mean temperatures, and an unpublished study of the standard deviation of upper air temperatures have been used to calculate approximate values for the probability of aircraft icing at low altitudes in each five degree box of latitude and longitude in the Northern Hemisphere between 20° and 75° North latitude. The values calculated have been used to plot three charts indicating the approximate probability of icing in each five degree box for January, April, and October. The methods used in calculating the probability values are described. Two Northern Hemisphere maps indicating the distribution of thunderstorms for the colder and warmer months are included in the report to serve as an aid in estimating the relative frequency of icing due to cumuliform clouds. Suggestions for further work which will result in better probability figures, using both available data and the forthcoming results of studies now in progress, are included. (Author)

Physics of the Atmosphere

NASA N62-12463 $3.60

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
MASS SPECTROMETRIC INVESTIGATIONS OF THE ATMOSPHERE BETWEEN 100 AND 227 KM ABOVE WALLOPS ISLAND, VIRGINIA, by Edith Meadows-Reed and Charles R. Smith. 1962, 34p. 24 refs.

NASA N63-10688 $2.60

Seagrove Radio Research Station, U. of Auckland (New Zealand)
LARGE-SCALE IRREGULARITIES IN THE IONOSPHERE, by J. E. Titheridge. Rept. on Grant NsG-54-60. [1962], 29p. 19 refs.

NASA N63-10486 $1.10

Seagrove Radio Research Station, U. of Auckland (New Zealand)
VARIATIONS IN THE TOTAL ELECTRON CONTENT OF THE IONOSPHERE AFTER THE HIGH ALTITUDE NUCLEAR EXPLOSION, by J. E. Titheridge. Rept. on Grant NsG-54-60. 1962, 7p. 2 refs.

NASA N62-10558 $7.60

Space Physics Research Lab., U. of Michigan, Ann Arbor.
THE DUMBBELL ELECTROSTATIC IONOSPHERE PROBE: ENGINEERING ASPECTS, by G. R. Carignan and L. H. Brace. Nov 61, 73p. 4 refs. Rept. on Contracts NASw-139, AF 19(604)6124 and DA 20-018-509-ORD-103. Scientific rept. JS-2; ORA rept. 03599-6-S.

ENGINEERING

TID-16952 $8.60

Texas U., Austin.
FEASIBILITY OF CREATING SPHERICAL CAVITIES IN UNDERGROUND SALT DOMES, by O. B. Dommers and F. W. Jessen. Final rept. on Contract AT(29-2)-1051. 31 Jan 61, 98p. 35 refs.

TID-16959 $1.10

Texas U., Austin.
FEASIBILITY OF CREATING SPHERICAL CAVITIES IN UNDERGROUND SALT DOMES. Progress rept. 1 Apr-1 June 61, on Contract AT(29-2)-1051. 9 Oct 62, 7p.

TID-16958 $1.60

Texas U., Austin.
FEASIBILITY OF CREATING SPHERICAL CAVITIES IN UNDERGROUND SALT DOMES. Progress rept. 1 June-1 Aug 61, on Contract AT(29-2)-1051. 9 Oct 62, 17p.

TID-16957 $4.60

Texas U., Austin.
FEASIBILITY OF CREATING SPHERICAL CAVITIES IN UNDERGROUND SALT DOMES. Progress rept. Aug-Sep 61, on Contract AT(29-2)-1051. 9 Oct 62, 49p.

TID-16956 $6.60

Texas U., Austin.
FEASIBILITY OF CREATING SPHERICAL CAVITIES IN UNDERGROUND SALT DOMES. Progress rept. Oct-Nov 61, on Contract AT(29-2)-1051. 9 Oct 62, 69p. 1 ref.

TID-16955 $4.60

Texas U., Austin.
FEASIBILITY OF CREATING SPHERICAL CAVITIES IN UNDERGROUND SALT DOMES. Progress rept. Feb-Mar 62, on Contract AT(29-2)-1051. [9 Oct 62] 50p.

TID-16954 $2.60

Texas U., Austin.
FEASIBILITY OF CREATING SPHERICAL CAVITIES IN UNDERGROUND SALT DOMES. Progress rept. Apr-May 62, on Contract AT(29-2)-1051. 9 Oct 62, 21p.

TID-16953 $3.60

Texas U., Austin.
FEASIBILITY OF CREATING SPHERICAL CAVITIES IN UNDERGROUND SALT DOMES. Progress rept. June-July 62, on Contract AT(29-2)-1051. 9 Oct 62, 33p.

TID-16994 $2.60

Texas U., Austin.
FEASIBILITY OF CREATING SPHERICAL CAVITIES IN UNDERGROUND SALT DOMES. Progress rept. for Aug-Sep 62, on Contract AT(29-2)1051. Oct 62, 25p.

Aeronautical Engineering

NASA N62-12456 $2.60

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
V/STOL HANDLING QUALITIES AS DETERMINED BY FLIGHT TEST AND SIMULATION TECHNIQUES, by Fred J. Drinkwater III, L. Stewart Rolls, and others. 1962, 25p. 5 refs.

To be presented at the 3rd International Congress of the Aeronautical Sciences, Stockholm, Sweden, Aug 27-Sep 1, 62.

NASA N63-11057 $2.25

Astro Research Corp., Santa Barbara, Calif.
A THEORY AND APPLICATIONS OF FILAMENTARY STRUCTURES, by H. U. Schuerch, O. R. Burggraf, and A. C. Kyser. Rept. on Contract NASr-8. Dec 62, 84p. 20 refs. NASA Technical note D-1692.

NASA N63-10801 $1.75

Douglas Aircraft Co., Inc., Santa Monica, Calif.
A GENERAL DIGITAL COMPUTER ANALYSIS OF STATICALLY INDETERMINATE STRUCTURES, by Paul H. Denke. Dec 62, 72p. 14 refs. NASA Technical note D-1666; superseded Engineering paper 834.

PB 162 411 $4.60

Engineering Div., Air Materiel Command, Wright-Patterson AFB, Ohio.
VIBRATION TESTING AS A GUIDE TO EQUIPMENT DESIGN FOR AIRCRAFT, by D. C. Kennard, Jr. June 49, declassified 12 Jan 56. 49p. 38 refs. AF Technical rept. no. 5847; ATI-57 845.

DESCRIPTORS: *Aircraft equipment, Design, Test methods, Vibration, *Vibrators (Mechanical)

The basis of modern laboratory vibration testing methods applied to aircraft equipment is presented. Significant data are included concerning the flight vibration characteristics of a wide variety of AF airplanes. The manner in which these data were used to derive testing methods in cognizance of the worst conditions of vibration likely to be encountered in service is discussed. Air craft equipment is classified according to three basic types of installation which establish the appropriate test method; i.e., direct installation on airframes, installation on reciprocating power plants, and installation on vibration-isolated assemblies..

NASA N63-11123 $1.25

Flight Research Center, National Aeronautics and Space Administration, Edwards, Calif.
OPERATIONAL EXPERIENCES AND CHARACTERISTICS OF THE X-15 FLIGHT CONTROL SYSTEM, by Robert A. Tremant. Dec 62, 50p. 4 refs. Technical note D-1402.

NASA N62-16810 $1.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
EFFECT OF AFTERBODY-EJECTOR CONFIGURATIONS ON THE PERFORMANCE AT TRANSONIC SPEEDS OF A PYLON-SUPPORTED NACELLE MODEL HAVING A HOT-JET EXHAUST, by John M. Swihart, Charles E. Mercer, and Harry T. Norton, Jr. Oct 62, 54p. 15 refs. Technical note D-1399.

PB 162 421 $10.10

Northrop Corp., Hawthorne, Calif.
THE INFLUENCE OF SERVOMECHANISMS ON THE FLUTTER OF SERVOCONTROLLED AIRCRAFT, by D. T. McRuer, D. Benun, and G. E. Click. Rept. on Research and Investigation of Flutter, Contract AF 33(600)6013. Mar 54, 122p. 8 refs. AF Technical rept. no. 6287; AD-41 702.

DESCRIPTORS: *Aircraft equipment, Control systems, *Servomechanisms, *Control surfaces, Flutter, *Airframes, Vibration, Couplings, Feedback.

The physical nature of possible couplings between structural and rigid-body vibrations of the airframe and the dynamical behavior of control system elements located within the airframe is discussed. The frequency dependences of several possible feedback couplings are presented, and there are discussions of the dependence of feedback couplings on reduced frequency. A large portion of the material is devoted to detailing those features of the dynamical behavior of control system elements which can influence the behavior of a flutter system. Methods are developed for analytically determining the flutter characteristics of servo-controlled aircraft. These methods are reasonably simple extensions of conventional flutter techniques. The report includes recommendations for future research efforts. (Author)

Chemical Engineering

ANL-6569 $2.75

Argonne National Lab., Ill.
CHEMICAL ENGINEERING DIVISION SUMMARY REPORT, APR-JUNE 1962. Rept. on Contract W-31-109-eng-38. Aug 62, 167p. 37 refs.

PB 181 467 $2.00

Monsanto [Research Corp.] Everett, Mass.
INVESTIGATION AND PREPARATION OF POLYMER FILMS TO IMPROVE THE SEPARATION OF WATER AND SALTS IN SALINE WATER CONVERSION. Rept. on Contract 14-01-001-203. Dec 62, 73p. 6 refs. Saline Water Research and Development Progress rept. no. 69.

DESCRIPTORS: *Polymers, *Films, *Plastic films, Preparation, Tests, *Sea water, *Desalination

The experimental program has been directed into two main areas of investigation: film evaluation and an elucidation of the basic principles which govern film performance. A cellulose acetate composition containing 10% PEG-200 was found to have a transmission rate of 1.07 g/cm^2/hr with better than 99% salt rejection. The development of a thermal method of film treatment resulted in increased rate and improved salt rejections. Modified polyvinyl alcohol and cellophane films have been found to give improved salt rejection while maintaining their attractive transmission rates. Theroetical implications of the modifications are discussed. The effects of ions other than Na^+ and Cl^- and wetting agents on film performance as well as the effect of film processing variables on film structure have been determined. Theories have been set forth that adequately explain the observed experimental facts. Evidence has been found to indicate that when water transmission occurs by a "hole" mechanism, salt transmission occurs as well. A solution mechanism alone can explain the observed high water transmission and low transmission of salt.

PB 181 466 $1.75

Stearns-Roger Mfg. Co., Denver, Colo.
SALINE WATER DEMONSTRATION PLANT NO. 1, FREEPORT, TEXAS. Annual rept. no. 1, Apr 61-June 62, on Contract 14-01-001-218. Jan 62, 69p. Saline Water Conversion Progress rept. no. 71.

DESCRIPTORS: *Sea water, Water, *Desalination, *Distilling plants, Operation, Economics, Texas.

Much technical information has been derived relevant to the materials, equipment, and procedures utilized at the Freeport Plant. This information can be invaluable in designing future plants, and for planning programs which will investigate the maximum utilization of present equip ment and/or the substitution of equipment better suited for the application involved.

ORNL-TM-265 $7.60

Oak Ridge National Lab., Tenn.
CHEMICAL TECHNOLOGY DIVISION. CHEMICAL DEVELOPMENT SECTION C, by K. B. Brown. Progress rept. Apr-June 62, on Contract W-7405-eng-26. 10 Aug 62, 77p. 25 refs.

TID-17061 $11.50

Ohio State U. Research Foundation, Columbus.
A STUDY OF THE GASEOUS IODINE-SOLID SILVER NITRATE REACTION BY USE OF TRACER TECHNIQUES, by James C. Leslie. Technical rept. no. 2, on Contract AT(11-1)-750. Sep 62, 140p. 65 refs.

Electrical and Electronic Engineering

PB 162 612 $3.60

Arinc Research Corp., Washington, D. C.
ESTIMATION OF RELAY FAILURE RATES, by R. O. Holbrook. Special rept. on Contract AF 33(600)42462. Feb 61, 32p. 3 refs. Publication no. 160-1-218; AD-254 186.

DESCRIPTORS: Relays, *Electric relays, *Failure (Mechanics), Airborne, Shipborne, Guided missiles, Reliability, *Electronic relays, Electronic circuits, Electric connectors, Electronic equipment, *Mathematical prediction.

Research is concerned with the development of failure rate data suitable for use in predictions of equipment and system reliability. A compilation is presented of data derived from over 20 million hours of relay operation and over 200 relay failures. Since the data were obtained in controlled tests, they may be considered to have a high degree of accuracy. Among the comparisons of failure rates which were made, the largest difference observed was one associated with use environment. Relays used in shipborne and ground equipment had a basic failure rate of 5.0 x 10 to the 6th power per hour, while for relays used in airborne equipment the basic rate was 50.0 x 10 to the 6th power per hour. A procedure was established for estimation of failure rates for each use condition. (Author)

PB 162 602 $13.00

Electric Machinery Lab., Mass. Inst. of Tech., Cambridge.
DETERMINATION OF OPTIMUM EXCITATION AND VOLTAGE CONTROL SYSTEMS FOR A-C GENERATORS, by M. Riaz, P. Heller and others. Rept. on Contract AF 33(616)101. 30 Sep 53, 181p. 61 refs. AF Technical rept. no. 6652; AD-27 884.

DESCRIPTORS: *Aircraft equipment, Electrical equipment, *Generators, Alternating current, Excitation, Control systems, Amplifiers, Magnetic amplifiers, Servomechanisms, Voltage regulators, Rectifiers.

Various components in aircraft regulating and excitation systems for ac generators were examined, including the ac generator, the dc exciter, magnetic amplifier, electronic amplifier, and electromechanical regulator. Chapters of this report are devoted to the design and analysis of a voltage regulating system, ac generators, comparison devices and rectifiers, exciters, electronic regulators and exciters, magnetic-amplifier regulator and exciter control systems, and electromechanical voltage regulators. Appendixes were concerned with linear regulator theory, nonlinear analysis, synchronous generator steady-state characteristics, rotary power supplies for missiles, and steady-state operation of dc machines.

PB 162 606 $5.60

Electric Storage Battery Co., West Orange, N. J.
HIGH CAPACITY VENTED NICKEL-CADMIUM CELLS, by Edward F. Schweitzer, Edward C. Kopper and others. Quarterly progress rept. no. 3, 1 June-31 Aug 60, on Contract DA 36-039-sc-84555. [1960] 59p. AD-247 280.

DESCRIPTORS: *Batteries and components, *Alkaline cells, Design, Manufacturing methods, Battery separators, Plastic films, Nylon, Impregnation, Cobalt, Nickel compounds, Nitrates

Failure of the nylon-polypor separator led to the testing of various other separator materials approximately 5-6 mils thick. The test cells (type 4) were subjected to a life test consisting of a 3.5 ampere charge for 3 hours (10.5 A.H. input) and a 3.5 ampere discharge for 2.5 hours (8.75 A.H. output) or a charge: discharge ratio of 1.20. In the optimum design of the elements of the six types of production cells, negative plates 0.037 inch thick and positive plates 0.044 inch thick are used which results in a total number of plates in the production cells of 13, 15, 17, 19, 23 and 27 for the Type 1 to Type 6 cells respectively, with one more positive than negative plate in each type. (See also 152 187)

PB 162 608 $1.60

[Glass Products Co., Santa Barbara, Calif.]
[INDUSTRIAL PREPAREDNESS STUDY] FOR PRECISION HIGH STABILITY RESISTORS, by Nathan Pritikin. Quarterly progress rept. no. 8, 1 Apr-30 June 58, on Contracts DA 36-039-sc-72722 and DA 36-039-sc-72723. 17 July 58, 14p. AD-200 119.

DESCRIPTORS: *Resistors, *Glass resistors, Production, Manufacturing methods, Machines, Thin films.

An industrial preparedness study is being made to obtain preproduction approval in compliance with the requirements of the applicable military specifications. An experimental machine was developed for melting a good electrical glass and flowing the molten glass in a thin film on a window glass base. A 0.25-in.-diam Pt rod was used as a doctor blade while the window glass was coated with a thickness of glass varying between

0.003 and 0.050 inch. Another machine was designed to accomodate a 3- by 6-in. glass and to hold at least a pound of molten glass. Ultrasonic griding was temporarily used in the fabrication of recesses. Preliminary tests of experimental sandwich construction using a capacitance welding system were successful in life tests extended over 500 hr. No cracks or failures developed during the testing, which included temperature cycling and 200°C storage. Tests of 3 silk screen frames indicated the necessity for modifications so that steel ties to the guides will be used instead of Al. An experimental die was successfully tested for pressing 6 resistors at once. (See also PB 137 171)

PB 162 609 $1.60

Glass Products Co., Santa Barbara, Calif.
[INDUSTRIAL PREPAREDNESS STUDY] FOR PRECISION HIGH STABILITY RESISTORS, by Nathan Pritikin. Quarterly progress rept. no. 11 and 12, 1 Jan-30 June 59, on Contract DA 36-039-sc-72722 and DA 36-039-sc-72723. 15 July 59, 12p. AD-228 071.

DESCRIPTORS: *Resistors, *Glass resistors, Production, Resistivity, Tests, Temperature.

Glass resistors were tested in regard to the percentage change in resistance as a result of a 1/2-w load at 100°C ambient. Fifty ohm, 237 K-ohm and 1.24 M-ohm resistors, subjected for 250 hr, averaged a resistance change of 0.07, 0.14 and 0.15%, respectively; for 500 hr, 0.10, 0.26, and 0.27%, respectively; for 750 hr, 0.14, 0.32 and 0.17%, respectively; and for 1000 hr, 0.21, 0.39, and 0.20%, respectively. No tolerance failures resulted. Temperature coefficient results are also presented. (See also PB 162 608)

PB 162 610 $1.60

Glass Products Co. [Santa Barbara, Calif.]
PRODUCTION ENGINEERING MEASURE FOR PRECISION HIGH STABILITY RESISTORS, by Nathan Pritikin. Quarterly progress repts. no. 14, 1 Oct-31 Dec 59, on Contracts DA 36-039-sc-72722 and DA 36-039-sc-72723. [1960] 15p. AD-232 094.

DESCRIPTORS: *Glass resistors, Production, Tests, Temperature, Humidity, Polarization, Failure (mechanics), Melting, Glass, *Resistors.

See also PB 162 609

AD-268 253 $10.50

Hamilton Standard Div., United Aircraft Corp., Broad Brook, Conn.
STUDY AND DEVELOPMENT OF TRANSISTORIZED MODULAR POWER CONVERTERS, by Frank Raposa. Final rept. 20 June-15 July 61, on Contract DA 36-039-sc-85369. [1961] 138p. 2 refs. Rept. no. HSER 2330.

DESCRIPTORS: *Power supplies, *Rectifiers, *Power transformers, *Voltage regulators, *Direct current, *Inverted rectifiers, Transistors, Design, Rectifiers, Diodes, Silicon, Packaged circuits, Electronic circuits, Electric filters, Capacitors.

Results of the concept study led to acceptance of the amplitude-modulation method of voltage regulation, using a make-up voltage sub-system to control amplitude of voltage to the power-switching stage. It was established that use of multi-winding transformers was (Engineering--Electronic, 20 Mar 63) (over)

feasible to provide multiple output voltages. Regulator circuits were investigated throughly; difficulties with magnetic amplifier circuits led to development of transistorized firing circuits for the SCR's for voltage control. Investigation of rectifier and filter circuits resulted in use of bridge rectifiers with capacitor filtering. A ripple factor was established for the circuit configuration; additional filtering, if required, can be incorporated in end-use equipment. Interchangeability of modules between the 2 series of converters was provided to the maximum possible extent. (Author) (See also AD-261 173)

PB 162 597 $2.60

International Resistance Co., Philadelphia, Pa.
RESISTORS, FIXED, NON-WIREWOUND (POWER TYPE), by Kenneth Lewis. Quarterly progress rept. no. 1, 1 May-31 July 58, on Contract DA 36-039-sc-75973. [1958] 26p. AD-210 887.

DESCRIPTORS: *Resistors, *Fixed resistors, Production, Metal films, Chromium, Nickel, Ceramic materials, Ink, Coatings.

The purpose of this contract is to set up a manufacturing facility to produce resistors in accordance with MIL-R-11804B (modified). This includes units which meet Characteristics "P" (235°C hot spot) and "T" (350°C hot spot). The specification designates power type film fixed resistors. A total of 8 styles is required each with "P" and "T" characteristics. (Author)

PB 162 590 $1.60

International Resistance Co., Philadelphia, Pa.
RESISTORS, FIXED, NON-WIREWOUND (POWER TYPE), by Kenneth R. Lewis. Quarterly progress rept. no. 2, 1 Aug-31 Oct 58, on Contract DA 36-039-sc-75973. [1958] 20p. AD-210 888.

DESCRIPTORS: *Resistors, *Fixed resistors, Production, Metal films, Chromium, Coatings, Silicones, Ceramic materials, Ink, Electric terminals.

Evaluation of substrates, films, terminals, protective coatings, and marking ink is reported. This evaluation showed that a pure chrome film, with a silicone protective coating, gives best results. A ceramic based pigment proved to be a suitable marking material for withstanding the specified environmental conditions. Substrates and terminals require further evaluation. Equipment for the production facility is being modified of procured where required. (Author) (See also PB 162 597)

PB 162 591 $2.60

International Resistance Co., Philadelphia, Pa. RESISTORS, FIXED, NON-WIREWOUND (POWER TYPE), by Stanley R. Kingsbury. Quarterly progress rept. no. 3, 1 Nov 58-31 Jan 59, on Contract DA 36-039-sc-75973. [1959] 25p. AD-219 030.

DESCRIPTORS: *Resistors, *Fixed resistors, Production, Ceramic materials, Alkaline earth metals, Electric terminals.

Evaluation of substrate materials resulted in alkaline earth 531 being chosen for styles RD-60, 65, 70, 31, 33 and 35. Evaluation of a substrate material for the RD-37 and RD-39 units is continuing. A silver plated spring material for the terminals of the RD-31, 33, 35 and 37 units was ordered, received, and proven satisfactory. Preproduction testing was begun on all styles of the RD-60, 65 and 70 units. Preproduction evaporation began on the RD-31, 33 and 35 units. (Author) (See also PB 162 590.

PB 162 592 $3.60

International Resistance Co., Philadelphia, Pa. RESISTORS, FIXED, NON-WIREWOUND (POWER TYPE), by Stanley R. Kingsbury. Quarterly progress rept. no. 4, 1 Feb-30 Apr 59, on Contract DA 36-039-sc-75973. [1959] 31p. AD-225 341.

DESCRIPTORS: *Resistors, *Fixed resistors, Production, Tests, Ceramic materials, Alkaline earth metals, Aluminum compounds, Oxides, Electric terminals

A substrate for the RD-31, 33, and 35 units was chosen and units were fabricated and tested. Results of this preliminary testing proved satisfactory and RD-31, 33, and 35 units were fabricated and submitted for preproduction testing. A tentative material choice of the RD-37 and 39 substrate was made and units fabricated are now being tested. Favorable results are being obtained on all preproduction tests. Terminals were received and used in the fabrication of the units submitted for preproduction testing. (Author) (See also PB 162 591)

PB 162 593 $4.60

International Resistance Co., Philadelphia, Pa. RESISTORS, FIXED, NON-WIREWOUND (POWER TYPE), by Warren Hobson. Quarterly progress rept. no. 5, 1 May-31 July 59, on Contract DA 36-039-sc-75973. [1959] 46p. AD-233 034.

DESCRIPTORS: *Resistors, *Fixed resistors, Production, Manufacturing methods, Ceramic materials, Metal films, Electric terminals

Preproduction testing of styles RD60 and RD65 was completed. The preproduction testing of styles RD31, RD33, RD35, and RD70 was under way. Units of style RD37 were being fabricated for preproduction testing. Difficulties in obtaining suitable substrates for the larger-sized units delayed preproduction testing of styles RD37 and RD39. Conventional ceramic processing techniques did not yield uniformly acceptable surfaces for metal film evaporation in these geometries. The production process for the resistors was being finalized. In the first step of the process, a band of conductive termination material is applied about the ends of the substrate. This termination material is then fired to the solid state. After firing, the units are mounted on an evaporation fixture and placed in an evaporator where a metal film is deposited on their surface. Next, samples of the metalized units are subjected to a temperautre coefficient test and to heat treatment which stabilizes unit characteristics. Subsequent to the heat treatment, leads and caps or bands are assembled on the ends of the units; these subassemblies are binned. Then the resistance of the subassemblies is adjusted to the final desired range. The adjusted units receive 2 protective overcoats. Finally, the finished units are tested and marked. (See also PB 162 592)

PB 162 594 $3.60

International Resistance Co., Philadelphia, Pa. RESISTORS, FIXED, NON-WIREWOUND (POWER TYPE), by B. Ingster. Quarterly progress rept. no. 6, 1 Aug-31 Oct 59, on Contract DA 36-039-sc-75973. [1959] 36p. 2 refs. AD-235 044.

DESCRIPTORS: *Fixed resistors, Design, Tests, Materials, Production, Ceramic materials, Vibration, Heat treatment, *Resistors.

A high temperature, power type, non-wirewound, fixed resistor is being developed that will operate satisfactorily with a 350°C hot-spot temperature. The proper substrate for all styles was determined, and the production process for RD60 and RD65 resistors was finalized, All preproduction testing on RD70 was completed. Preproduction testing in Groups I, II, and III was completed for styles RD31, RD33, and RD35. The production process for RD70, RD31, RD33, and RD35 is expected to be finalized upon completion and acceptance of the preproduction testing program for these styles. Descriptions of all equipment used in the production of style RD60, RD65, and RD70 resistors are included. (Author) (See also PB 162 593)

PB 162 595 $1.60

International Resistance Co., Philadelphia, Pa. RESISTORS, FIXED, NON-WIREWOUND (POWER TYPE), by B. Ingster. Quarterly progress rept. no. 7, 1 Nov 59-31 Jan 60, on Contract DA 36-039-sc-75973. [1960] 20p. AD-239 597.

DESCRIPTORS: *Fixed resistors, *Resistors, Ceramic materisls, Production, Tests.

The pilot runs of styles RD60, RD65, and RD70 were started. With the acceptance of preproduction data including Group IV testing, a production process for the manufacture of styles RD70, RD31, RD33, and RD35 has been established. A schedule for the fabrication of both the RD37 and RD39 units was developed. Because of the delays caused by the lack of a sufficient quantity of acceptable RD37 and RD39 substrates, a request for revision of the delivery schedule is being processed. (Author) (See also PB 162 594)

PB 162 596 $1.60

International Resistance Co., Philadelphia, Pa.
RESISTORS, FIXED, NON-WIREWOUND (POWER TYPE), by Dorothy M. Hoffman and William Leopold. Quarterly progress rept. no. 8, 1 Feb-30 Apr 60, on Contract DA 36-039-sc-75973. [1960] 18p. AD-240 380.

DESCRIPTORS: *Resistors, *Fixed resistors, Production, Metal films, Tests.

The additional load-life testing specified in the modified technical requirements was started. The fabrication of RD37 and RD39 for preproduction testing was started. The pilot production of styles RD60, RD65, and RD70 was completed. (See also PB 162 595)

NASA N62-11497 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
DESIGN TECHNIQUES FOR LOW-POWER TELEMETRY, by Robert L. Choate. Rept. on Contract NAS7-100. 5 Mar 62, 14p. 17 refs. Technical rept. no. 32-153.

UCRL-7085 $3.60

Lawrence Radiation Lab., U. of California, Livermore
AN EVALUATION OF VACUUM TUBES FOR LOG IN AMPLIFIERS, by Emil Sikorsky. Rept. on Contract W-7405-eng-48. 9 Oct 62, 39p. 6 refs.

PB 162 366 $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
BAND-PASS FILTERS WITH LINEAR PHASE, by Robert M. Lerner. Rept. on Contract AF 19(122)458. July 57, reissued Jan 59 and May 60, 25p. 3 refs. Group rept. no. 36-18; AD-236 399.

DESCRIPTORS: *Band-pass filters, Phase distortion, Mathematical analysis, Phase studies, Synthesis, Tuned circuits, Communication equipment, Theory.

Band-pass filters whose frequency responses have 'flat' tops and steep sides have wide application. In systems in which an arbitrary number of filters must be used in cascade, the flat-topped characteristic is a means of preserving the bandwidth available through the system. The conventional means of synthesizing such filters generally yield structures with phase distortion which becomes worse as the sharpness of the filter skirts is increased. For applications in which phase distortion is detrimental, such as pulsed data or TV transmission, it has been necessary to design equalizers to straighten out the phase characteristic - a procedure which adds considerably to the cost and complexity of a design. It is possible to incorporate control of the amplitude and phase errors in the pass-band and the asymptotic behavior outside the pass-band into a single design procedure. It is found that the frequency response of networks designed according to this procedure may cut off faster in the neighborhood of the band edge than a Butterworth filter with the same number of elements. A means for calculating these networks is outlined which is simple, flexible, and requires neither extensive tables of functions nor the calculation of roots of equations. (Author)

NASA N62-12322 $1.25

Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
ADVANCED STATIC INVERTER UTILIZING DIGITAL TECHNIQUES AND HARMONIC CANCELLATION, by Dorrance L. Anderson, Albert E. Willis, and Carl E. Winkler. May 62, 42p. Technical note D-602.

MND-P-2483-7 $0.50

Martin Marietta Corp., Baltimore, Md.
SNAP 7 PROGRAM. TASK 8. STRONTIUM-90 FUELED THERMOELECTRIC GENERATOR DEVELOPMENT. Quarterly progress rept. no. 7, 1 May-31 July 62, on Contract AT(30-3)-217. 20p.

NASA N63-10952 $1.00

Minneapolis-Honeywell Regulator Co., Minn.
A LOGICAL NET MECHANIZATION FOR TIME-OPTIMAL REGULATION, by Fred B. Smith, Jr. Rept. on Contract NASr-27. Dec 62, 35p. 3 refs. NASA Technical note D-1678.

AD-290 775 repriced $2.00

Naval Ordnance Lab., White Oak, Md.
THE NATURE OF MICROWAVE PARAMETRIC AMPLIFICATION, by Edward T. Hooper, Jr. 5 Sep 62, 78p. 40 refs. Rept. no. NOLTR 62-102.

DESCRIPTORS: *Microwave amplifiers, *Parametric amplifiers, Amplifiers, Operation, Power, Feedback, Cavity resonators, Resonance, Coupling circuits, Electron beams, Microwave frequency.

The principles of parametric amplification are discussed. Included are the conservation theorems that place restraints on powers at various frequencies, feedbacks operating internally, the physical mechanisms of pumping resonant circuits, and the physical mechanisms of pumping and coupling in propagating systems. The treatment is theoretical in nature: Known laws and relations are surveyed and the theory is extended to include the nature of the feedback, pumping, and coupling mechanisms. Feedback is found to be positive for the lower-sideband three frequency parametric amplifier, but also positive for the upper-sideband case where limited gain results from the feedback loop gain being less than unity. An entire spectrum of permitted pumping frequencies below the system resonant frequency, as well as above, has been found. Although the results are applicable to all parametric amplifiers, illustrations are taken from amplifiers in the microwave frequency range. (Author)

PB 162 564 $5.60

Philco Corp., Philadelphia, Pa.
ELECTROLYTIC CAPACITORS. Summary rept. 1 May 58-31 July 59, on Contract NObsr-72770. 30 Sep 59, 55p. 29 refs. Philco no. H-2177-F; AD-226 843.

DESCRIPTORS: *Semiconductors, Capacitors, *Electrolytic capacitors, *Thin films, Foams, Electrodes, *Silicon compounds, Carbides, *Zirconium compounds, *Tantalium compounds, *Niobium compounds, Photoelectric effect, *Aluminum compounds, Oxides, Boron compounds, Silicides, Capacitors.

Ta/Ta_2O_5, NG/NG_2O_5, and Al/Al_2O_3 electrodes were studied in an electrolyte containing either RbI or NaI in liquid SO_2. Rb^+ blocked the current flow when RGI and NaI were used simultaneously. The existence of a high but thin surface barrier on anodic valve metal oxides was conclusively demonstrated. A photoeffect was found on Nb/Nb_2O_5 in the wavelength region from 3600 to 3900 A. The system Ta/Ta_2O_5 showed an increased conductivity in an H atmosphere in both the cathodic and anodic directions. Solid electrolytic condensers $Ti/TiO_2/$ metal contact appear feasible because of the high dielectric constant of TiO_2. The absence of surface roughness and the crystal structure are postulated as being responsible for the superior performance of sputtered $Ta/Ta_2O_5/$ metal contact capacitors. Surface roughness had a pronounced effect in the Al/Al_2O_3/metal contact system. TaC and BSi foams were unsuitable for formation of current-blocking oxide layers.

PB 162 581 $2.60

Polytechnic Inst. of Brooklyn, N. Y.
FUEL CELL AND ITS RELATED TECHNOLOGY. I. CORRELATION BETWEEN MAGNETIC SUSCEPTIBILITY AND CATALYTIC ACTIVITY OF ELECTRODE, by Ju Chin Chu and S. M. Hu. Bimonthly progress rept. 16 July-15 Sep 60, on Contract DA 44-009-eng-4586. [1960] 29p. [Fuel cell rept. no. 1] AD-252 101.

DESCRIPTORS: *Fuel cells, *Power supplies, *Electrodes, *Magnetic susceptibility, Measurement, Magnetic properties, Materials, Ferromagnetic materials, Thin films, Metals, Metal films, Catalysis, Electrochemistry, Test methods.

Main effort was given to the design of an electrode sample which could furnish satisfactory data for both e.m.f. and magnetic susceptibility. Three best devices for measuring magnetic susceptibility are presented. The first one is designed to measure the magnetic susceptibility and e.m.f. simultaneously. The other two are for separate measurements. A special device was contrived for the first method which enable the measurement of susceptibility in the presence of an electrolyte. The first method is recommended with res ervation since the technique is the first of its kind. (Author)

PB 162 577 $3.60

Polytechnic Inst. of Brooklyn, N. Y.
FUEL CELL AND ITS RELATED TECHNOLOGY. I. CORRELATION BETWEEN MAGNETIC SUSCEPTIBILITY AND CATALYTIC ACTIVITY OF ELECTRODE, by Ju Chin Chu and S. M. Hu. Bimonthly progress rept. 16 Sep-15 Nov 60, on Contract DA 44-009-eng-4586. [1960] 37p. 31 refs. Fuel cell rept. no. 4; AD-252 102.

DESCRIPTORS: *Fuel cells, *Power supplies, Design, *Magnetic susceptibility, Materials, Magnetic properties, *Catalysis, *Electrodes, Electrochemistry, *Thin films, Metal films, Ferromagnetism, Measurement, Test methods, Magnetometers.

The theory of magnetism was outlined with a short account for the molecular field theory of paramagnetism and domain theory of ferromagnetism. Due discussion was presented on ferromagnetism in thin films as a necessary prior knowledge in experimentation with thin films. Phenomena associated with thin films are the uncertainty in the decrease of magnetization, transition of the magnetism type and thickness limitation for the ferromagnetism, Contamination, notably oxygen, of the ferromagnetic films affects markedly the magnetic properties. A new experimental technique was proposed which was aimed to avoid air contamination and to have a greater certainty of measuring accuracy. The apparatus used is a modification of the one used by Neugebauer in the measurement of saturation magnetization of thin films below 100 Angstroms. The experimental method is based on the principle of torque magnetometer. A torsion wire also serves as a lead to potentiometer for e.m.f. measurement. Dynamic e.m.f. will be measured for various current densities. The inadequacy of an open circuit potential of a catalytic electrode is discussed. (Author) (See also PB 162 581)

PB 162 579 $3.60

Polytechnic Inst. of Brooklyn, N. Y.
FUEL CELL AND ITS RELATED TECHNOLOGY. I. CORRELATION BETWEEN MAGNETIC SUSCEPTIBILITY AND CATALYTIC ACTIVITY OF ELECTRODE, by Ju Chin Chu and S. M. Hu. Bimonthly progress rept. 16 Nov 60-15 Jan 61, on Contract DA 44-009-eng-4586. [1961] 39p. Fuel cell rept. no. 7; AD-252 103.

DESCRIPTORS: *Fuel cells, Measurement, *Power supplies, *Magnetic susceptibility, Magnetic properties, *Catalysis, Metal films, Magnetometers. Electrochemistry, Test methods.

A revised method is described in which the thin metallic films used as catalyst are vacuum deposited outside the sample cell. In this method the deposition of thin films is to be carried out in an ordinary bell-jar vacuum deposition system with minor mechanical modification. A small thin-walled glass container with a neoprene O-ring packing is used to keep the sample from air contamination. The glass container is compact and lightweight and is easily transported. This container is then broken with a plunger in the sample cell. A preliminary study of the feasibility of use of the torque magnetometer was made. The result shows that the sensitivity of this method is extremely high. For the purpose of investigating the transient behavior of the catalytic surface, the modified Guoy's method was adopted. This method measures magnetic susceptibility in a closed system, and uses an Ainsworth's Model RV-AU-1 automatic recording vacuum balance. By this method, it is possible to study transient phenomena. (Author) (See also PB 162 577)

PB 162 582 $1.60

Polytechnic Inst. of Brooklyn, N. Y.
FUEL CELL AND ITS RELATED TECHNOLOGY. II. CORRELATION BETWEEN INFRARED SPECTRUM AND CATALYTIC ACTIVITY OF ELECTRODE, by Ju Chin Chu and W. S. Yu. Bimonthly progress rept. 16 July-15 Sep 60, on Contract DA 44-009-eng-4586. [1960] 18p. 20 refs. Fuel cell rept. no. 2; AD-252 104.

DESCRIPTORS: *Fuel cells, *Power supplies, Infrared spectroscopy, *Electrodes, Design, *Catalysis, Chemical reactions, Adsorption, Surface properties, Molecular structure, Electrochemistry, *Thin films, Absorption,

The objective of this work is to develop a quantitative relation between the catalytic activity and reaction kinetics on the surface of the fuel cell electrode. For the catalytic activity, the half cell potential is used as a practical index. The reaction kinetics is analyzed by IR spectra from the chemisorption of the gases by the catalytic surface on the electrode. A sound correlation between the IR spectra and half-cell potential can lead to a successful development for a practical fuel cell employing hydrocarbon and other cheaper fuels. Work in the previous literature was reviewed. It was found that the successful work had been mostly with the absorption IR technique. The application of the reflection technique was quite recent and no work was reported for a system of three co-existing phases, i.e., electrode surface, gas and liquid electrolyte. The in situ fuel electrode is housed in a high vacuum system for the catalyst deposition on the electrode surface. Provision should be made to introduce fuel gas and electrolyte into the system. The correlation between the half cell potential and infrared spectra can be obtained by using the same fuel gas and different catalysts on the same electrode under a given operating condition. The relative order of the catalytic activities can thus be determined. (Author)

PB 162 583 $1.60

Polytechnic Inst. of Brooklyn, N. Y.
FUEL CELL AND ITS RELATED TECHNOLOGY. II. CORRELATION BETWEEN INFRARED SPECTRUM AND CATALYTIC ACTIVITY OF ELECTRODE, by Ju Chin Chu and W. S. Yu. Bimonthly progress rept. 16 Sep-15 Nov 60, on Contract DA 44-009-eng-4586. [1960] 18p. 1 ref. Fuel cell rept. no. 5; AD-252 105

DESCRIPTORS: *Fuel cells, *Power supplies, Design, Infrared spectroscopy, *Catalysis, *Electrodes, *Infrared spectrophotometers, Surface properties, Chemical reactions, Test equipment, Electrochemistry.

An infrared optical system for reflection has been designed as an attachment for Perkin-Elmer Model 21 Double Beam Spectrophotometer. This system is to be mounted between the exit of the source and the entrance of the monochromator. The infrared energy from the source will be reflected back to the entrance slit of the monochromator and has the same image as the energy directly passes the sample area. Within such an optical system, the catalyst for the fuel cell electrode is in the form of a mirror surface which gives characteristic peak spectrum upon the absorption of infrared energy in the presence of surface reaction. (Author) (See also PB 162 582)

PB 162 585 $2.60

Polytechnic Inst. of Brooklyn, N. Y.
FUEL CELL AND ITS RELATED TECHNOLOGY. II. CORRELATION BETWEEN INFRARED SPECTRUM AND CATALYTIC ACTIVITY OF ELECTRODE, by Ju Chin Chu and W. S. Yu. Bimonthly progress rept. 16 Dec 60-15 Jan 61, on Contract DA 44-009-eng-4586. [1961] 21p. Fuel cell rept. no. 8; AD-252 106.

DESCRIPTORS: *Power supplies, *Fuel cells, Design, Infrared spectroscopy, Electrodes, *Catalysis, *Infrared spectrophotometers, Absorption, Adsorption, Electrochemistry, Materials.

An outline about fuel gas cell is given. A design of an in situ type sample cell has been described. An experimental technique has been proposed for recording the infrared spectrum during the chemisorption of fuels upon a metallic catalyst surface and also for measuring the half cell potential as soon as the infrared spectrum is obtained. The details of instrumentation are considered. The Perkin-Elmer double-beam infrared spectrophotometer Model 21 will be modified according to the alternate optical system. The design of this system and the suitable sample cell is given in the report. Some details of experimental techniques are described. (Author) (See also PB 162 583)

PB 162 576 $2.60

Polytechnic Inst. of Brooklyn, N. Y.
FUEL CELL AND ITS RELATED TECHNOLOGY. III. CORRELATION BETWEEN SURFACE CONDUCTIVITY AND CATALYTIC ACTIVITY OF ELECTRODE, by Ju Chin Chu and Leonard M. Salzarulo. Bimonthly progress rept. 16 July-15 Sep 60, on Contract DA 44-009-eng-4586. [1960] 22p. 13 refs. Fuel cell rept. no. 3; AD-252 107.

DESCRIPTORS: *Power supplies, *Fuel cells, Design, *Surface properties, *Electrodes, *Catalysis, Electrochemistry, *Conductivity, Semiconductors, *Thin films, Adsorption.

To date no entirely satisfactory means of measuring the catalyst activity within a fuel cell has been devised. It is the objective of this investigation to measure the surface conductivity and to correlate the latter with the activity of various catalysts. Frequency response approach for the investigation of cell kinetics is also proposed in the report. The basic theory and possible advantage are discussed. Conductivity measurement alone gives information about the product of mobility and carrier concentration. Hall effect determines these quantities separately. The so-called Hall coefficient can be evaluated if a current is passed through the materials at right angles to a magnetic field. Both the frequency response and Hall effect techniques, although promising, are beyond the scope of the current contract. (Author)

PB 162 584 $1.60

Polytechnic Inst. of Brooklyn, N. Y.
FUEL CELL AND ITS RELATED TECHNOLOGY. III. CORRELATION BETWEEN SURFACE CONDUCTIVITY AND CATALYTIC ACTIVITY OF ELECTRODE, by Ju Chin Chu and Leonard M. Salzarulo. Bimonthly progress rept. 16 Sep-15 Nov 60, on Contract DA 44-009-eng-4586. [1960] 11p. 2 refs. Fuel cell rept. no. 6; AD-252 108.

DESCRIPTORS: *Fuel cells, *Power supplies, *Electrodes, *Catalysis, *Conductivity, Surface properties, Design, Electrochemistry, Metals, Catalysts, Absorption, Gases, Adsorption, Determination, Test methods, Measurement.

The difficulty involved in the determination of surface conductivity for the electrode in a fuel cell has been eliminated. The change of surface conductivity on the the electrode is determined prior to the introduction of the liquid electrolyte into the cell. The half cell potential will be measured with the proper provision to eliminate the polarization at the standard electrode. A method is proposed for the measurement of surface conductivity during the chemisorption of gas upon a metallic catalyst. The measurement is accomplished by using the catalyst surface as one plate of a cylindrical capacitor. Since the conductivity of each of the plates of a capacitor contributes to the capacity loss, any change in surface conductivity will cause a change in capacity loss. Therefore, a measurement of capacity loss can be used as an indirect measure of surface conductivity. Apparatus for measuring half-cell potential and electrical conductivity has been designed. A calomel electrode will be used to measure half-cell potential for the fuel electrode. (Author) (See also PB 162 576)

PB 162 580 $2.60

Polytechnic Inst. of Brooklyn, N. Y.
FUEL CELL AND ITS RELATED TECHNOLOGY. III. CORRELATION BETWEEN SURFACE CONDUCTIVITY AND CATALYTIC ACTIVITY OF ELECTRODE, by Ju Chin Chu and Leonard M. Salzarulo. Bimonthly progress rept. 16 Nov 60-15 Jan 61, on Contract DA 44-009-eng-4586. [1961] 28p. Fuel cell rept. no. 9; AD-252 109.

DESCRIPTORS: *Fuel cells, *Power supplies, *Electrodes, Surface properties, Design, *Conductivity, *Catalysis, Polarization, Electric potential, Transport properties, Gases, Electrolytes, Electrochemistry, Measurement, Catalysts.

During the operation of a fuel cell, the observed potential is lower than the theoretical or equilibrium potential. This is due to polarization which occur during current flow. The various types of polarization which occur in a fuel cell are discussed. Among these: activation polarization, mass transport polarization, gas transport polarization, and electrolyte concentration polarization. It is the objective of the work to determine the effect of catalyst upon the activation polarization. Quantitative expressions are developed for various polarizations for the data interpretation. A fuel cell constructed of PVC has been designed and fabricated. The cell contains two stuffing boxes, one in the top flange and one in the bottom of the cell. A sintered alumina tube impregnated with the metal catalyst under study is positioned between the stuffing boxes. Conductivity measurements, in the absence of electrolyte, and half-cell potentials, in the presence of electrolyte, can be made. (Author) (See also PB 162 584)

NASA N62-15890 $2.60

Purdue U., Lafayette, Ind.
OPTIMUM NONLINEAR CONTROL FOR ARBITRARY DISTURBANCES, by R. Oldenburger and N. P. Smith. Rept. on Grant NsG-38-59. [1960] 29p. 7 refs.

PB 162 375 $8.60

Purdue U., Lafayette, Ind.
PLASMA PHYSICS, by S. Gartenhaus. Rept. on Contract AF 08(635)723. Aug 60, 96p. 18 refs. APGC-TN-60-75; AD-241 455

DESCRIPTORS: *Plasma physics, *Magnetohydrodynamics, Electrostatic fields, Magnetic fields, Magnetic pinch, Partial differential equations, Fourier analysis, Statistical analysis.

Lecture Notes for 1960 Summer Seminar Sponsored by the Florida State University Graduate Center. The purpose of the seminar was to give the participants a fairly comprehensive introduction to the subject of plasma physics, with emphasis on the underlying physical principles. The topics covered include Maxwell's equations, orbit theory, the collapse of an axial pinch, the equations of magnetohydrodynamics and the Vlasov-Boltzmann equation. (Author)

PB 162 616 $6.60

Sperry Gyroscope Co., Great Neck, N. Y.
BROADBAND WAVEGUIDE AND WAVEGUIDE COMPONENT TECHNIQUES AND DESIGNS. Final rept. 15 Sep-15 Dec 48, on Contract W36-039-sc-36770, continuation of Contract W36-039-sc-32259. Mar 49, 69p. 8 refs. Sperry rept. no. 5224-1137; ATI-169 374.

DESCRIPTORS: Broadband, *Waveguides, Waveguide irises, Waveguide filters, Coaxial cables, Transformers, Design.

Filter networks, polarization converters and a coaxial line to waveguide transformer were investigated over a six-month period. The emphasis was placed on the establishment of design principles, techniques and procedures that would permit units to be designed on paper to meet pre-determined criteria for broadband performance. (Author)

PB 162 373 $7.60

Union Carbide Consumer Products Co., Parma, Ohio.
FUEL CELL INVESTIGATION, by Albert F. Vinal and Terrence J. Kurtzweil. Rept. on Contract AF 30(602)2199. 25 Oct 60, 73p. 19 refs. RADC-TR-60-251; AD-248 204.

DESCRIPTORS: *Storage batteries, Electrolytic cells, Hydrogen, Oxygen, Design, Power supplies, *Power plants, Voltage, Costs, Electrochemistry, Storage.

An engineering feasibility study has been made of the state-of-the-art of fuel cells and specific system selected for design of an electrical power station of 1000 megawatts capacity at 500 volts for 30 minutes' life with stand-by time of three years and full capacity development in one minute or less. The proposed low-temperature hydrogen-oxygen fuel cell is a gas-pressurized static system having no moving parts or auxiliaries and with concomitant freedom from all supplementary utilities together with minimum maintenance. Over the operational life, voltage regulation may be held to ±5 per cent at a current density of 170 amperes per square foot and internal cell temperature rise of about 5C. A power station concept based on modules of 27 kw capacity permits a high degree of flexibility in arrangement and in selectivity of power and voltage if desired. The extrapolated system can be operated intermittently and infrequently, and from open circuit to full load practically instantaneously. (Author)

PB 162 617 $10.10

Varian Associates, Palo Alto, Calif.
GAS CELL FREQUENCY STANDARD DEVELOPMENT PROGRAM, by R. Whitehorn. Final rept. on Contract DA 36-039-sc-75029 and National Bureau of Standards Contract CST-328. Dec 59, 127p. 1 ref. Engineering rept. no. 228-1F; AD-232 632.

DESCRIPTORS: Radiofrequency, Standards, *Frequency multipliers, Design, *Cavity resonators, *Discharge tubes, Oscillators, Rubidium.

An experimental model Rb^{87} stabilized oscillator is described which might be used as a gas cell frequency standard. The theory underlying the development of the unit is presented, and the system actually employed is described in detail. Specific weaknesses and areas for future development are also indicated. The details of the modules used to construct the breadboard model, including schematic diagrams and parts lists, are given in the appendix. (Author)

PB 162 603 $3.60

Weapons Guidance Lab. [Aeronautical Systems Div.] Wright-Patterson AFB, Ohio.
STATISTICAL THEORY AS APPLIED TO RELIABILITY ACCEPTANCE TESTS, by Rita M. Gustin. Dec 58, 37p. 19 refs. WADC Technical rept. 58-482; AD-155 877.

DESCRIPTORS: Reliability, Statistical tests, *Reliability (Electronics), Binomials, Probability, Statistical distributions, Sampling, Statistical analysis, Sequential analysis.

For a given type of failure population, the parameters which characterize that population are estimated by sample statistics which are known to be efficient estimators of the desired parameters. Since the estimate from any one random sample can be an improbable one, the known distribution of the estimator is used to establish confidence intervals. This controls the risk of accepting an assumed distribution incorrectly; but to also control the risk of rejecting equipment whose meantime-between-failures is as good as specified, the probability ratio test is used. Sequential analysis is the most efficient ratio test. (Author)

PB 162 451 $2.60

[Army Ordnance] Arsenal, Philadelphia, Pa.
THE CONCEPT OF EQUIPMENT STATUS INDICATION, by G. R. Staton. May 59, 24p. 6 refs. Memo. rept. no. M59-23-1; AD-226 112.

DESCRIPTORS: *Military equipment, Maintenance, Test methods, *Ordnance, Transducers (Acoustic), Military requirements.

The concept of Equipment Status Indication (ESI) is presented; i.e., methods of acquiring indications of the existing condition of Ordnance equipment and the possibilities of predicting the remaining useful life of the same. The elimination of unnecessary tear downs, rebuilds and repairs of complex equipment is envisioned along with improved equipment reliability and reduced maintenance and attendant cost. Three approaches to ESI are discussed: (1) built-in indicators; (2) automatic and semi-automatic checkout systems; and (3) prediction-diagnosis systems. The theory involved, advantages, limitations, and general design information of each approach are presented, as well as a guide for the selection of the proper method of ESI and a detailed discussion of applicable transducer techniques. (Author)

PB 181 465 $5.00

Army Ordnance School, Aberdeen Proving Ground, Md.
ORDNANCE TECHNICAL TERMINOLOGY. Special Text. June 62, 358p.

DESCRIPTORS: *Ordnance, *Dictionaries, *Handbooks, *Documentation

The purpose of this volume is to make available for resident instruction a convenient and ready reference of definitions and other pertinent information concerning terms and abbreviations frequently encountered in publications and activities connected with Ordnance. It should also serve to promote uniformity in the use and understanding of Ordnance terminology. Definitions which are not of Ordnance interest have generally been omitted. The publication consists of a single aplhabetical listing of approximately 10,500 entries, including 8,200 defined terms, 1,500 entries for cross-reference, and 800 commonly encountered abbreviations. The technical terms are not adequately defined as to Ordnance application in standard dictionaries and other readily available sources.

NASA N63-10868 $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
DIFFERENTIAL CORRECTION FOR VINTI'S ACCURATE INTERMEDIARY ORBIT, by N. L. Bonavito. Dec 62, 18p. 3 refs. Technical note D-1445.

NASA N63-11237 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
AERODYNAMIC STABILITY OF PLANETARY ENTRY-VEHICLES, by W. Brofman. Rept. on Contract NAS7-100. 24 Sep. 62, 19p. 6 refs. Technical rept. no. 32-338.

NASA N62-12749 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE APPLICATION OF OPTICAL SENSORS FOR LUNAR AND PLANETARY SPACE VEHICLES, by J. R. Scull. Rept. on Contract NAS7-100. 31 May 62, 20p. 11 refs. Technical rept. no. 32-274.

NASA N63-10953 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena, Calif.
A BASIS FOR A SEPARATE TREATY FOR BANNING WEAPONS IN SPACE, by Richard P. Schuster, Jr. Rept. on Contract NAS7-100. 20 Nov 62, 15p. Study memo. no. 40-1.

NASA N62-12811 $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
CONTROL AND GUIDANCE OF ELECTRICALLY PROPELLED SPACECRAFT, by Philip J. Hirrel. Rept. on Contract NASw-6. 15 Sep. 61, 25p. 6 refs. Technical rept. no. 32-166.

NASA N62-12677 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
CONSTANTS AND RELATED DATA USED IN TRAJECTORY CALCULATIONS AT THE JET PROPULSION LABORATORY, by Victor C. Clarke, Jr. Rept. on Contract NAS7-100. 1 May 62, 17p. 16 refs. Technical rept. no. 32-273.

NASA N62-12957 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
DESIGN OF LUNAR AND INTERPLANETARY ASCENT TRAJECTORIES, by Victor C. Clarke, Jr. Rept. on Contract NAS7-100. 15 Mar 62, 20p. Technical rept. no 32-30, Rev. 1.

NASA N62-10817 $3.60

Jet Propulsion Lab., Calif. Inst. of Tech. Pasadena.
GROUND EQUIPMENT FOR SATELLITE COMMUNICATION, by Walter K. Victor. Rept. on Contract NASw-6. 30 Oct 51, 35p. 13 refs. Technical rept. no. 32-137.

NASA N62-12748 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
A NUCLEAR-ELECTRIC SPACEBUS FOR PLANETARY LANDING MISSIONS, by Robert J. Beale and Evelyn W. Speiser. Rept. on Contract NAS7-100. 1 May 62, 17p. 4 refs. Technical rept. no. 32-231.

NASA N62-11501 $7.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE PIONEER IV LUNAR PROBE: A MINIMUM-POWER FM/PM SYSTEM DESIGN, by Benn D. Martin. Rept. on Contract NAS7-100. 15 Mar 62, 76p. 106 refs. Technical rept. no. 32-215.

NASA N62-12276 $8.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-12, VOLUME I. Rept. for 1 Sep-1 Nov 61, on Contract NASw-6. 1 Dec 61, 94p. 5 refs.

NASA N62-12277 $8.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-13, VOLUME I. Rept. for 1 Nov 61-1 Jan 62, on Contract NAS7-100. 1 Feb 62, 92p. 8 refs.

NASA N62-12172 $10.50

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-14, VOLUME I. Rept. for 1 Jan-1 Mar 62, on Contract NAS7-100. 1 Apr 62, 138p. 22 refs.

NASA N63-10334 $6.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-17, VOLUME VI. SPACE EXPLORATION PROGRAMS AND SPACE SCIENCES. Rept. for 1 July-1 Oct 62, on Contract NAS7-100. 31 Oct 62, 67p. 5 refs.

NASA N62-12743 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SYSTEMS ENGINEERING OF A NUCLEAR-ELECTRIC SPACECRAFT, by Robert J. Beale. Rept. on Contract NASw-6. 31 Oct 61, 18p. 5 refs. Technical rept. no. 32-158.

NASA N62-12810 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THEORY AND APPLICATION OF THE CRITICAL DIRECTION METHOD OF TRAJECTORY OPTIMIZATION by Carl G. Pfeiffer. Rept. on Contract NASw-6. 15 Sep 61, 11p. 8 refs. Technical rept. no. 32-155.

NASA N63-10795 $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AN ANALYSIS OF THE CONING MOTIONS OF THE FINAL STAGES OF THREE NASA SCOUT DEVELOPMENT VEHICLES, by George R. Young and James J. Buglia. Dec 62, 30p. 8 refs. Technical note D-1396.

NASA N63-10798 $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
A FREE-FLIGHT INVESTIGATION OF ABLATION OF A BLUNT BODY TO A MACH NUMBER OF 13.1, by Clyde W. Winters, William G. Witte and others. Dec 62, 23p. 11 refs. Technical note D-1500.

NASA N63-10797 $1.25

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
LANDING CHARACTERISTICS OF A WINGED REENTRY VEHICLE WITH ALL-SKID LANDING GEAR HAVING YIELDING-METAL SHOCK ABSORBERS, by Ulysse J. Blanchard. Dec 62, 45p. 5 refs. Technical note D-1496.

NASA N63-10968 $5.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
OVERALL MISSILE DYNAMICS, by Harry L. Runyan. Lecture notes. 30 Oct 62, 58p. 21 refs.

NASA N63-11122 $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
SIMULATOR STUDY OF AN ACTIVE CONTROL SYSTEM FOR A SPINNING BODY, by James J. Adams. Dec 62, 21p. 1 ref. Technical note D-1515.

NASA N63-10904 $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
A STUDY OF ABORT FROM A MANNED LUNAR LANDING AND RETURN TO RENDEZVOUS IN A 50-MILE ORBIT, by Jack A. White. Dec 62, 14p. 2 refs. Technical note D-1514.

NASA N63-11615 $0.75

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
ANALOG STUDY OF DESCENTS FROM LUNAR ORBIT, by Joseph N. Sivo and Carl E. Campbell. Dec 62, 25p. 7 refs. Technical note D-1530.

NASA N63-10734 $2.25

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
ANALYSIS OF GUIDANCE PERTURBATIONS FOR A LOW-THRUST MARS ORBITER MISSION USING SNAP-8, by Alan L. Friedlander. Dec 62, 83p. 5 refs. Technical note D-1433.

NASA N63-11618 $0.50

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
EFFECT OF THE ACCELERATION DISTURBANCES ENCOUNTERED IN THE MA-7 SPACECRAFT ON THE LIQUID-VAPOR INTERFACE IN A BAFFLED TANK DURING WEIGHTLESSNESS, by Donald A. Petrash, Ralph C. Nussle, and Edward W. Otto. Jan 63, 15p. 2 refs. Technical note D-1577.

NASA N63-10733 $0.50

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
HEAT TRANSFER TO A SPHERE WITH A RETRO-ROCKET EXHAUSTING INTO A FREE STREAM: MACH 2.0 AND 0.8, by Robert A. Wasko. Nov 62, 20p. 3 refs. Technical note D-1535.

NASA N63-11613 $1.00

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
OPTIMUM LOW-ACCELERATION TRAJECTORIES FOR INTERPLANETARY TRANSFERS, by Arthur V. Zimmerman, John S. MacKay, and Leonard G. Rossa. Jan 63, 41p. 8 refs. Technical note D-1456.

NASA N63-11121 $2.00

Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
THERMAL RADIATION INCIDENT ON AN EARTH SATELLITE, by Frank E. Swalley. Dec 62, 73p. 8 refs. Technical note D-1524.

NASA N63-10793 $2.50

National Aeronautics and Space Administration, Washington, D. C.
PROCEEDINGS OF CONFERENCE ON SPACECRAFT STERILIZATION, ed. by Freeman H. Quimby. Dec 62, 104p. Technical note D-1357.

AD-286 501 repriced $0.75

Naval Ordnance Lab., White Oak, Md.
THE GROWTH TO DETONATION OF LOW DENSITY EXPLOSIVE MIXTURES, by Howard S. Leopold and D. McVaney. Sep 62, 26p. 4 refs. Rept. no. NOLTR 62-89.

DESCRIPTORS: *Explosive materials, Mixtures, *Detonation, Detonators, Electric detonators, Design, Velocity, Propagation, Lead compounds, Silver compounds, Aluminum, Styphnates, Azides, PETN, Explosives, Photographic analysis, Rotating-mirror cameras.

The growth to detonation of normal lead styphnate-lead azide, normal lead styphnate-silver azide, normal lead styphnate-PETN, and normal lead styphnate-flake aluminum mixtures was observed using a rotating mirror smear camera. Normal lead styphnate-lead

azide mixtures (75/25 to 25/75 proportions) retain the hot wire sensitivity of the normal lead styphnate and develop a terminal detonation velocity characteristic of the lead azide. Normal lead styphnate-PETN mixtures propagate slower than normal lead styphnate alone. Silver azide-PETN mixtures develop a terminal detonation velocity characteristic of PETN. (Author)

AD-285 398 repriced $2.00

Naval Ordnance Lab., White Oak, Md.
REPORT ON PHASE II OF THE FEASIBILITY COMMITTEE FOR 200,000-FOOT ALTITUDE INSTRUMENTED HASP, by M. J. Parker, S. J. Raff and others. Aug 62, 74p. 2 refs. Rept. no. NOLTR 61-15.

DESCRIPTORS: *Sounding rockets, Rocket heads, High altitude, Upper atmosphere, Radar confusion reflectors, Meteorological radar, Meteorological balloons, Gun launched, Telemetering, Instrumentation.

Research concerns the production of an engineering design of a meteorological rocket head. The meteorological rocket is intended to be part of the High Altitude Sounding Projectile (HASP) family. The final results of the investigation were the successful firing of three instrumented HASP rounds in 1 3/8-in. diam. HASP heads using the 100,000-ft. rocket motor. This instrumented HASP used the so-called telemetering-only instrumentation. The temperature was measured by a bead thermistor and was telemetered to the ground instrumentation. Also included were: (a) the initiation of a contract to develop a miniature baroswitch for sensing pressure (b) successful HASP wind-tunnel tests using pressures equivalent to 100,000-ft. altitude (c) an extensive analysis of ROBIN, a Rocket Balloon Instrument and (d) a complete analysis leading to designs for the descent device for the HASP instrument package. (Author)

NASA N62-10769 $4.60

Rochester U. Coll. of Engineering, N. Y.
NASA SPACE ENVIRONMENT TEST CHAMBER AND SOLAR RADIATION SIMULATOR, by J. W. Graham, Jr and Daniel W. Healy, Jr. Final rept. on Contract Contract NASw-181. 20 Oct 61, 42p.

TID-17306 $8.60

Sigma Corp., Los Altos, Calif.
APPLICATION OF NUCLEAR POWER SUPPLIES TO SPACE SYSTEMS. Rept. on Contract AT(11-1)GEN-8. 30 June 60, 73p. LA-3301.

NASA N62-10654 $1.60

Yale U., New Haven, Conn.
ON COMMUNICATION SYSTEMS FOR SATELLITE TELEMETRY, by Jay W. Schwartz. Technical note no. 1 on Grant NsG-138-61. Nov 61, 20p. 6 refs.

Sanitation and Safety Engineering

TID-16825 $1.60

Metrix, Inc., Deerfield, Ill.
SOLID VS. LAMINATED LARGE STEEL SHIELDS, by S. Regas, V. W. Walter, and E. C. Anderson. 1962 13p. Prepared in cooperation with Los Alamos Scientific Lab., N. Mex.

AD-288 228 repriced $2.00

Naval Radiological Defense Lab., San Francisco, Calif.
THE FAMILY OCCUPANCY TEST, 4-6 NOVEMBER 1960, by W. E. Strope, H. S. Etter and others. 22 Aug 62, 71p. 5 refs. Rept. no. USNRDL-TR-578.

DESCRIPTORS: *Air raid shelters, *Underground structures, *Civilian defense systems, Shelters, *Adaptation (Physiology), Adjustment (Psychology), Heat, Children, Radiological warfare, Management engineering.

The USNRDL experimental shelter at Camp Parks, California, was occupied for a period of 48 hours by 99 men, women, and children. Ages of the participants ranged from about 3 months to 68 years. Family size ranged from single persons to a family of seven. All aspects of the shelter environment as well as the actions and responses of the shelterees were monitored. Children of all ages appeared to adapt well to shelter conditions, but the importance of careful preparation, organization, and control of activities was demonstrated. This is a preliminary report made in advance of complete analysis of the data. (Author)

TID-16788 $1.60

Oak Ridge Gaseous Diffusion Plant, Tenn.
THE INFLUENCE OF FIELD AGING ON GAS MASK CANISTERS, ARMY TYPE M-11, by W. D. Box. Rept. on Contract W7405-eng-26. 9 Oct 62, 12p. 1 ref.

TID-17025 $9.60

Reynolds Electrical and Engineering Co., Inc., Mercury, Nev.
BASIC RADIOLOGICAL SAFETY TRAINING MANUAL. Jan 62, 113p.

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

NLCO-857 $0.75

National Lead Co. of Ohio, Cincinnati.
THREE-ROLL ROTARY-PIERCING OPERATION FOR THE FABRICATION OF URANIUM TUBES, by H. Davis and J. F. Schiltz. Rept. on Contract AT(30-1)-1156. 5 Oct 62, 26p.

Engines and Propulsion Systems

NASA N63-10493 $10.50

Aerojet-General Corp., Sacramento, Calif.
A STUDY OF ROCKET ENGINE SYSTEM RELIABILITY, by James. H. Madden. Final rept. on Contract NASr-66. 16 Oct 62, 135p. 9 refs. Rept. no. 0599-01F, vol. 1.

NASA N62-11328 $1.10

Electro-Optical Systems, Inc., Pasadena, Calif..
CONDENSER HEAT REJECTION SYSTEMS, by Lance G. Hays. Monthly progress rept., 1 Jan-1 Feb 61, on Contract NAS7-11. 8 Feb 61, 9p. EOS rept. 388-ML-3.

DC-60-1-4 $6.60

General Electric Co., Cincinnati, Ohio.
FREE - ANP NO. 332, EA NO. 7-1203, by W. R. Strong. Preliminary rept. on Contracts AT(11-1)171, AF 33(038)21102, and AF 33(600)38062. 21 Dec 59, 67p. 4 refs.

APEX-602 $13.50

General Electric Co., Cincinnati, Ohio.
PARAMETRIC ANALYSIS OF SOME FAST OXIDE-FUELED SYSTEMS WITH MODERATING REFLECTORS. Declassified 19 Nov 62. 199p.

NASA N62-12672 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
A 500-ELECTRICAL-WATT SOLAR ENERGY THERMIONIC CONVERSION SYSTEM FOR A MARS SPACECRAFT, by Arvin H. Smith. Rept. on Contract NAS7-100. 15 Apr 62, 15p. 11 refs. Technical rept. no. 32-171.

NASA N62-12673 $4.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
DEVELOPMENT OF A LIGHT-WEIGHT REGENERATIVELY COOLED THRUST CHAMBER WITH BRAZED RIBS AND BRAZED OUTER WIRE TRAP, by Milton B. Noel and Paul F. Massier. Rept. on Contract NAS7-100. 15 May 62, 49p. 12 refs. Technical rept. no. 32-219.

NASA N62-12153 $3.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
EXPERIMENTAL INVESTIGATION AND EMPIRICAL CORRELATION OF LOCAL HEAT-TRANSFER RATES IN ROCKET-ENGINE THRUST CHAMBERS, by Arvel B. Witte and Edward Y. Harper. Rept. on Contract NAS7-100. 19 Mar 62, 35p. 17 refs. Technical rept. no. 32-244.

NASA N62-11498 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
INTERPLANETARY TRAJECTORY OPTIMIZATION WITH POWER-LIMITED PROPULSION SYSTEMS, by W. G. Melbourne, D. E. Richardson, and others. Rept. on Contract NAS7-100. 26 Feb 62, 20p. 11 refs. Technical rept. no. 32-173.

NASA N62-12674 $3.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
PAYLOAD OPTIMIZATION FOR POWER-LIMITED VEHICLES, by W. G. Melbourne and C. G. Sauer, Jr. Rept. on Contract NAS7-100. 9 Apr 62, 31p. 8 refs. Technical rept. no. 32-250.

Presented at the Electric Propulsion Conference of the American Rocket Society, Berkeley, California, March 14-16, 1962.

NASA N63-10765 $7.60

Jet Propulsion Lab., Calif. Inst of Tech., Pasadena.
PUBLICATIONS OF THE JET PROPULSION LABORATORY, JULY 1961 THROUGH JUNE 1962, by S. L. Kresser and R. J. Sippel. Rept. on Contract NAS7-100. 15 Oct 62, 77p. 287 refs. Bibliography no. 39-3.

NASA N63-10972 $2.60

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
THE ELECTRON-BOMBARDMENT ION ROCKET, by Harold R. Kaufman. Oct 62, 22p. 14 refs. Paper E-1862.

NASA N63-10881 $1.00

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
AN ELECTRON-BOMBARDMENT ION ROCKET OPERATED WITH ALTERNATING-CURRENT SUPPLIES, by Paul D. Reader and Robert C. Finke. Dec 62, 34p. 3 refs. Technical note D-1457.

NASA N63-10971 $1.60

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
NASA RESEARCH ON RESISTANCE HEATED HYDROGEN JETS, by John R. Jack. Oct 62, 19p. 5 refs. Paper E-1895.

NASA N63-10735 $2.25

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
SPACE-CHARGE-FLOW THEORY AND ELECTRODE DESIGN FOR ELECTROSTATIC ROCKET ENGINES, by David L. Lockwood and Vladimir Hamza. Dec 62, 100p. 24 refs. Technical note D-1461.

LA-2707 $1.75

Los Alamos Scientific Lab., N. Mex.
FAST REACTOR ROCKET ENGINES--CRITICALITY, by Ralph S. Cooper. Rept. on Contract W-7405-eng-36. May 62, 70p. 18 refs.

NASA N62-12123 $1.60

Marquardt Corp., Van Nuys, Calif.
PYROLYTIC GRAPHITE ROCKET THRUST CHAMBER INVESTIGATION PROJECT, C. D. Coulbert. Monthly letter progress rept., 8 Dec 61-7 Jan 62, on Contract NAS7-54. 18 Jan 62, 20p. Marquardt rept. no. PR-264-7.

ORNL-1227 $14.00

Oak Ridge National Lab., Tenn.
AIRCRAFT NUCLEAR PROPULSION PROJECT, ed. by W. B. Cottrell. Quarterly progress rept. for period ending 10 Mar 52, Contract W-7405-eng-26. 7 May 52, declassified 9 Apr 62. 196p.

ORNL-1294 $13.00

Oak Ridge National Lab., Tenn.
AIRCRAFT NUCLEAR PROPULSION PROJECT, ed. by W. B. Cottrell. Quarterly progress rept. for period ending 10 June 52, on Contract W-7405-eng-26. 5 Aug 52, declassified 25 June 62. 177p.

ORNL-2106(Pts. 1-5) $18.00

Oak Ridge National Lab., Tenn.
AIRCRAFT NUCLEAR PROPULSION PROJECT. Quarterly progress rept. for period ending 10 June 56, on Contract W-7405-eng-26. 4 Sep 56, declassified 11 Jan 62. 294p. 69 refs.

Machine Parts and Mechanisms

NASA N63-11680 $1.00

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
METHOD FOR DESIGN OF PUMP IMPELLERS USING A HIGH-SPEED DIGITAL COMPUTER, by Norbert O. Stockman and John L. Kramer. Jan 63, 36p. 9 refs. Technical note D-1562.

UVA-269-62U $1.60

Research Labs. for the Engineering Sciences, U. of Virginia, Charlottesville.
SPRING AND DAMPING COEFFICIENTS IN BEARING ASSEMBLIES HAVING ONE AND TWO FLUID FILMS, by R. L. Tomlin and H. M. Parker. Rept. on Contract AT(40-1)1779 Oct 62, 11p. 2 refs. Rept. on EP-4422-269-62U.

NASA N62-12809 $10.10

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
BEHAVIOR OF MATERIALS IN SPACE ENVIRONMENTS, by L. D. Jaffe and J. B. Rittenhouse. Rept. on Contract NASw-6. 1 Nov 61, 124p. 330 refs. Technical rept. no. 32-150.

NASA N62-12744 $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
EVAPORATION EFFECTS ON MATERIALS IN SPACE, by Leonard D. Jaffe and John B. Rittenhouse. Rept. on Contract NASw-6. 30 Oct 61, 21p. 77 refs. Technical rept. no. 32-161.

PB 162 449 $1.60

Naval Avionics Facility, Indianapolis, Ind.
EMBEDDING RESINS FOR USE IN ELECTRO-MECHANICAL COMPONENTS AT TEMPERATURES OVER 200°C, by Clifford O. Brown. Progress rept. no. 1. Jan 58, 12p. Materials rept. no. 51; AD-200089.

DESCRIPTORS: *Heat resistant plastics, *Embedding substances, *Epoxy resins, Anhydrides, Thermal expansion, Tests.

The evaluation of high heat distortion casting resins was continued. Formulations were prepared using various combinations of anhydrides, including methyl-nadic anhydride, hexahydro-phthalic anhydride, and others, in conjunction with pyromellitic dianhydride. A test procedure was devised to compare the heat resistance of these formulations which employed the apparatus normally used to determine the coefficient of thermal expansion. The ASTM Heat Distortion Temperature apparatus was modified for higher temperature operation.

Ceramics and Refractories

IS-459 $0.75

Ames Lab., Iowa State U. of Science and Tech.
LARGE BRIDGMAN-TYPE UNIT FOR PREPARING LARGE AND SMALL DIAMETER SINGLE CRYSTALS, by Robert E. Slonaker, Jr., Morton Smutz, and Edwin H. Olson. Rept. on Contract W-7405-eng-82. July 62, 35p. 4 refs.

BMI-1579 $1.00

Battelle Memorial Inst., Columbus, Ohio.
IMPROVED TECHNIQUES FOR DISPERSING COATED FUEL PARTICLES IN CERAMIC BODIES, by Allison K. Smalley, M. Clifford Brockway, and Winston H. Duckworth. Rept. on Contract W7405-eng-92. 22 May 62, 34p. 6 refs.

NASA N63-11308 $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THERMAL EXPANSION IN AIR OF CERAMIC OXIDES TO 2200°C, by T. H. Nielsen and M. H. Leipold. 30 Oct 62, 30p. 9 refs. Technical rept. no. 32-297.

NASA N63-10986 $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
DETERIORATION OF CALCIA-STABILIZED ZIRCONIA, by John D. Buckley. Master's thesis. Dec 62, 23p. 6 refs. Technical note D-1595.

PB 162 369 $1.60

New Jersey Ceramic Research Station, Rutgers U., New Brunswick.
LIMITATIONS AND POSSIBILITIES OF CRYSTAL SYNTHESIS BY THE FLAME FUSION PROCESS, by W. H. Bauer and I. Gordon. Final rept. on Contract N7onr-454 Task 2. 1 Aug 51, 12p. 3 refs. ATI-181 151.

DESCRIPTORS: *Single crystals, Synthesis, *Silicates, Tourmaline, Mullite, *Crystal growth, Flames, Melting, Crystals, Growth.

PB 162 423 $3.60

Research and Advanced Development Div., Avco Corp., Wilmington, Mass.
THE REACTION OF GLASSES, PYROLYTIC GRAPHITE, AND SELECTED REFRACTORIES WITH SODIUM VAPOR AT ELEVATED TEMPERATURES, by Michael E. Ihnat. Rept. on Research on Plasma Propulsion, Contract AF 49(638)659. Apr 60, reprinted June 62, 38p. Technical memo. RAD-TM-60-44; ARPA Order no. 6-58; AFOSR-TN-60-871; NASA N62-13989.

DESCRIPTORS: *Glass, *Graphite, *Refractory materials, Boron compounds, Nitrides, Aluminum compounds, Beryllium compounds, Magnesium compounds, Oxides, *Propellants, Alkali metals, *Sodium, Vapors, High temperature research.

The materials Vycor, Pyrex, boron nitride, aluminum oxide (Morganite), beryllium oxide, magnesium oxide (99 percent dense), aluminum oxide (fully dense) and pyrolytic graphite were exposed to sodium vapor at a measured temperature of 940°C (1725°F) for a period of fifteen minutes. The complete loss of the Vycor sample, structural disintegration of pyrolytic graphite, reaction of Pyrex, and diffusion of sodium into the less dense ceramics was observed. A corrosive reaction of type 304 stainless was observed where it was in contact with the Vycor sample. The test shows the need for dense ceramics where sodium vapors are to be in contact with alkali metal propulsion system components. (Author)

Fuels, Lubricants, and Hydraulic Fluids

AD-284 399 repriced $1.25

Bureau of Mines, Pittsburgh, Pa.
REVIEW OF FIRE AND EXPLOSION HAZARDS OF FLIGHT VEHICLE COMBUSTIBLES, by George S. Scott, Henry E. Perlee and others. Rept. for Apr 61-Apr 62, on Flight Vehicle Hazard Protection, Contract AF 33(616)60-8. Oct 62, 50p. 13 refs. Technical Documentary rept. no. ASD-TR-61-278, supplement 1.

DESCRIPTORS: *Liquid rocket propellants, *Jet engine fuels, Ignition, Combustion, Oxygen, Air, Flame arrestors, Nitrogen compounds, Tetrodes, Temperature, Vapor pressure, Detonation, Hazards

The prevention of fires and explosions involving the combustibles and oxidants likely to be found in flight vehicles requires a knowledge of the flammability and related characteristics of these materials. This report, the second in a series, presents the phases of the general problem where information was lacking or insufficient. These include: Ignition energy requirements and limits of flammability of selected combustibles in oxidants other than air; effect of blending of fuels on the spontaneous ignition temperature; effect of temperature on the limits of flammability and minimum oxygen requirements for flame propagation of selected combustibles; behavior of layered vapor and liquid-vapor mixtures in various oxidizing atmospheres; behavior of flame arrestors in static and in laminar and turbulent flowing mixtures. (See also AD-262 989)

NASA N62-11485 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
EFFECTS OF IONIZING RADIATION ON SOLID ROCKET MOTOR COMPONENTS, by Richard E. Gardner. Rept. on Contract NAS7-100, 21 Dec 61, 16p. 5 refs. Technical rept. no. 32-234.

NASA N62-11488 $1.10

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
STRAIN MEASUREMENTS ON A PRESSURIZED SOLID PROPELLANT GRAIN, by A. San Miguel. Rept. on Contract NAS7-100. 15 Mar 62, 8p. 10 refs. Technical rept. no. 32-182.

Leather and Textiles

AD-287 911 repriced $1.50

Quartermaster Research and Engineering Command, Natick, Mass.
PROCEEDINGS OF THE TEXTILE AND CLOTHING SEMINAR. Sep 62, 52p. 35 refs. Textile Series rept. no. 121.

DESCRIPTORS: *Textiles, Conferences, Textile industry, Scientific research, Supplies, *Synthetic fibers, *Fire resistant textiles, *Metallic textiles, *Protective clothing, Exposure suits, Flight clothing, Gasproof clothing, *Body armor, *Clothing.

This report of a seminar held at the Quartermaster Research and Engineering Center on 17-18 May 1962 includes papers by representatives of the Air Force, Army and Navy on applications of textiles and clothing for space, for nuclear and limited warfare, and for surface ships and submarines. Problems faced by the military departments in these areas and approaches to the solution of difficult technical problems are discussed. Presentations by members of a panel from the textile industry cover the interrelationship of industrial and military research and the role of industry in making its resources available to the military in our present economy. (Author)

PB 162 439 $4.60

Southern Research Inst., Birmingham, Ala.
DETERIORATION OF FIBROUS MATERIALS BY ULTRAVIOLET LIGHT, by Charles V. Stephenson, William S. Wilcox and others. Annual rept. no. 2, 15 Dec 60-15 Dec 61, on Fibrous Materials for Decelerators and Structures, Contract AF 33(616)7701, Dec 61, 46p. 15 refs. Research rept. 6228-1246-XI; ASD Technical rept. 61-730.

DESCRIPTORS: *Textiles, Deterioration, *Ultraviolet radiation, Nylon, *Synthetic fibers, Materials, Radiation effects, Glass textiles, Silicon compounds, Oxides, Halocarbon plastics, Dacron, Polyethylene plastics.

Textile and fibrous materials were irradiated in oxygen, nitrogen, and vacua of 5×10^{-2} mm and 1×10^{-6} mm. Deterioration of all hydrogen-containing polymers is faster when irradiated in oxygen than when irradiated in nitrogen or in a vacuum. Unlike the other polymers studied, the experimental polymer HT-1 deteriorates more rapidly when irradiated with 369 mμ ultraviolet than when irradiated with 244 mμ or 314 mμ ultraviolet. Fiberglas and fused silica are unaffected by ultraviolet. (Author)

MATHEMATICS

AD-279 197 $1.10

Electronics Research Lab., U. of California, Berkeley.
A GEOMETRIC INTERPRETATION OF THE PSEUDO INVERSE OF A MATRIX, by C. A. Desoer. Rept. on National Science Foundation Grant G-12142. 28 Dec 61, 10p. 8 refs. Series no. 60, Issue no. 426.

DESCRIPTORS: *Matrix algebra, Algebra, Equations, *Projective geometry, Transformations (Mathematics), Real variables, Complex variables.

NASA N62-11495 $1.10

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
REGULARITY AND POSITIONAL GAMES, by A. W. Hales and R. I. Jewett. Rept. on Contract NAS7-100. 31 Jan 62, 7p. 5 refs. Technical rept. no. 32-134.

KAPL-M-MCR-2 $1.60

Knolls Atomic Power Lab., Schenectady, N. Y.
BERRY, LINEAR SIMULTANEOUS EQUATION SOLUTION PROGRAM, by Mary C. Ray. Rept. on Contract W-31-109-eng-52. 17 Sep 62, 16p.

KAPL-M-WBJ-1 $2.60

Knolls Atomic Power Lab., Schenectady, N. Y.
ENTH2, A PROGRAM TO FIT FUNCTIONS OF ONE VARIABLE, by W. B. Jordan. Rept. on Contract W-31-109-eng-52. 18 Sep 62, 26p.

KAPL-M-EPS-2 $1.60

Knolls Atomic Power Lab., Schenectady, N. Y.
ON THE NUMERICAL SOLUTION OF CERTAIN COUPLED PARTIAL DIFFERENTIAL EQUATIONS, by E. P. Shelly. Rept. on Contract W-31-109-eng-52. 6 Sep 62, 16p. 10 refs.

KAPL-M-EC-26 $2.60

Knolls Atomic Power Lab., Schenectady, N. Y.
SRS - SCRAM ROD DRIVE MECHANISM PROGRAM, by D. L. Briggs and J. R. Schmid. Rept. on Contract W-31-109-eng-52. 1 Oct 62, 21p. 2 refs.

NASA N63-11620 $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
A METHOD FOR COMPUTING THE EFFECT OF AN ADDITIONAL OBSERVATION ON A PREVIOUS LEAST-SQUARES ESTIMATE, by Patrick A. Gainer. Jan 63, 17p. 6 refs. Technical note D-1599.

LA-2729 $1.75

Los Alamos Scientific Lab., N. Mex.
NUMERICAL SOLUTIONS AND APPLICATIONS OF THE FOLD INTEGRAL, by H. J. Longley. Rept. on Contract W-7405-eng-36. July 62, 73p. 11 refs.

LAMS-2747 $0.50

Los Alamos Scientific Lab., N. Mex.
A CODE FOR REDUCING MANY-GROUP CROSS SECTIONS TO FEW GROUPS, Ralph S. Cooper. Rept. on Contract W-7405-eng-36. 11 Sep 59, 13p.

NDA-2014-162 $1.10

Nuclear Development Corp. of America, White Plains, N. Y.
MATHEMATICAL FUNCTIONS RELATED TO DOPPLER COEFFICIENTS, by J. Certaine and C. Klahr. 20 Feb 57, 8p.

ORNL-TM-394 $7.60

Oak Ridge National Lab., Tenn.
CRITICAL PATH SCHEDULING BY THE LINEAR PROGRAMMING METHOD, by Royes Salmon. Rept. on Contract W7405-eng-26. 30 Aug 62, 72p. 3 refs.

NASA N62-16528 $3.60

Rias, Baltimore, Md.
PERIODIC MOTIONS IN BANACH SPACE AND APPLICATIONS TO FUNCTIONAL-DIFFERENTIAL EQUATIONS, by G. Stephen Jones. Rept. on Contracts NASr-103, DA 36-034-ORD-3514, and AF 49(638)382. [1962] 37p. 12 refs.

Computing Devices

PB 162 601 $6.60

IBM Federal Systems Div., Owego, N. Y.
SYNTHESIS AND PREPARATION OF REPRODUCIBLE FERROMAGNETIC MATERIALS WITH OPTIMUM CHARACTERISTICS FOR MULTIAPERTURES MAGNETIC DEVICES. Final rept. on Contract AF 33(600)31315. Dec 59, 65p. 20 refs. WADC-TR-59-649; AD-231 124.

DESCRIPTORS: *Ferromagnetic materials, Ferrites, *Ferrite cores, *Memory devices, Thin films, *Digital computers, Synthesis, Magnetic properties, Nickel alloys, Iron alloys, *Magnetic materials, Computers.

Ferrite materials: A wide variety of ferrite compositions are available to circuit design personnel. Those discussed were prepared to provide a variety of materials for core logic circuit evaluation. Preliminary characterization was performed to determine trends in various compositions. Vacuum-deposited magnetic materials: Investigation of gas absorption on thin magnetic films of the nickel-iron type produced valuable data. The large amount of hydrogen collected from the bell jar during evaporations indicates that high-temperature metal vapors crack the backstreaming diffusion pump oil. CO and CO_2 are formed but not collected in the present system because they are trapped either by the Meissner trap or by the evaporated film. The gas absorbed in the films was calculated to be as high as one gas molecule per 10 metal atoms deposited. The amount of gas absorbed, the H_2 to CO ratio, and the film surface texture were shown to be related to the substrate temperature. The dependence of gas absorption on surface texture was not determined. (Author)

UCRL-10313 $3.60

Lawrence Radiation Lab., U. of California, Berkeley.
CURRENT PERFORMANCE OF THE ALVAREZ-GROUP DATA PROCESSING SYSTEM, by Arthur H. Rosenfeld. Rept. on Contract W-7405-eng-48. 28 June 62, 33p. 13 refs.

UCRL-10278 $1.10

Lawrence Radiation Lab., U. of California, Berkeley.
AN ELECTRONIC ANALOG SYSTEM FOR KINEMATICAL ANALYSIS OF INTERACTION VERTICES, by Joseph J. Murray. Rept. on Contract W-7405-eng-48. 6 June 62, 6p.

AD-285 393 repriced $2.75

Naval Ordnance Lab., White Oak, Md.
ARABIC NUMERAL TIME ACCUMULATOR FOR SOMTER PLAYBACK SYSTEM MOD 2, by George J. Moss, Jr. 25 July 62, 135p. 6 refs. Rept. no. NOLTR 62-31.

DESCRIPTORS: *Computers, *Digital recording systems, *Circuits, Numerical methods and procedures, Matrix algebra, Equations, Sequences, Electronic circuits, Memory devices, Counting methods, Design.

The SOMTER Arabic Numeral Time Accumulator (SANTA) is an electronic counter scaled in time units, with a capacity of twenty days. Input may be in the form of pulses representing either one minute or one second intervals. On receipt of an actuating signal, SANTA generates coded electrical signals suitable for printing of its contents in Arabic numeral format with a digital recorder with a single row of electric stili. The logical design, circuit design, and output voltage waveforms of SANTA are discussed. (Author)

TID-12557 $1.60

Oak Ridge Gaseous Diffusion Plant, Tenn.
OPERATING EXPERIENCE WITH A SOLID STATE DATA LOGGER, by O. J. Baker and H. F. Dunlap. Rept. on Contract [W7405-eng-26.] 27 Apr 61. 19p.

MECHANICS

NASA N62-11494 $3.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
ANALYSIS OF A CIRCULAR, CYLINDRICAL SHELL LOADED AS A SIMPLE CANTILEVER, by H. E. Williams. Rept. on Contract NASw-6. 1 Sep 61, 36p. Technical rept. no. 32-64.

NASA N62-12249 $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
DYNAMIC TESTING OF PRESSURE TRANSDUCERS--A PROGRESS REPORT, by Jon Inskeep. Rept. on Contract NASw-6. 6 Dec 61, 21p. 12 refs. Technical rept. no. 32-268.

NASA N62-12958 $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
EXPERIMENTAL STUDY OF A COMPRESSIBLE VISCOUS VORTEX, by James M. Kendall, Jr. Rept. on Contract NAS7-100. 5 June 62, 22p. 26 refs. Technical rept. on 32-290.

NASA N62-12527 $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
INVESTIGATION OF A PULSE-TORQUED SYSTEM, by A. R. Johnston and S. Szirmay. Rept. on Contract NASw-6. 19 Apr 61, 25p. 8 refs. Technical rept. no. 32-136.

NASA N62-12108 $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
STRESS DISTRIBUTION ABOUT A SLOWLY GROWING CRACK DETERMINED BY THE PHOTOELASTIC COATING METHOD, by William Gerberich. Rept. on Contract NAS7-100. 4 Apr 62, 28p. 14 refs. Technical rept. no. 32-208.

TID-16723 $1.60

Knolls Atomic Power Lab., Schenectady, N. Y.
THE CLAMPED PLATE ANALOGY FOR THERMOELASTICITY, by Arthur L. Ross. [1957]. 17p. 10 refs.

NASA N63-10804 $8.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
COLLECTED PAPERS ON INSTABILITY OF SHELL STRUCTURES - 1962. Dec 62, 757p. 575 refs. Technical note D-1510.

NASA N63-10987 $0.75

Massachusetts Inst. of Tech., Cambridge.
ON SCALING LAWS FOR MATERIAL DAMPING, by Stephen H. Crandall. Dec 62, 25p. 8 refs. NASA Technical note D-1467.

TID-16947 $2.60

Mechanical Technology Inc., Latham, N. Y.
VISCOUS SHEAR COMPRESSOR, by E. B. Arwas and B. Sternlicht. Rept. on Contract Nonr 3730(00). Sep 62, 26p. MTI-62TR21.

NASA N63-10644 $2.60

Mellon Inst. of Industrial Research, Pittsburgh, Pa.
AN INSTRUMENT FOR MEASURING TORSIONAL CREEP AND RECOVERY, by Donald J. Plazek. Rept. on Grant NsG-147-61. [1962] 25p. 5 refs.

Presented at the 33rd Annual Meeting of the Society of Rheology, Johns Hopkins U., Oct. 29, 1962.

NASA N62-10655 $5.60

Michigan U., Ann Arbor.
FREQUENCIES AND MODES OF VIBRATION OF BUCKLED CIRCULAR PLATES, by E. F. Masur and B. Herzog. Final rept. on Contract NAw-6559. 29 Dec 61, 57p. 26 refs. ORA proj. 02835-1-F.

AD-278 275 repriced $0.75

Naval Ordnance Lab., White Oak, Md.
UPPER AND LOWER BOUNDS FOR THE APSIDAL ANGLE IN THE THEORY OF THE SPHERICAL PENDULUM, by J. B. Diaz and F. T. Metcalf. June 62, 27p. 17 refs. Rept. no. NOLTR 62-55; NASA N62-13997.

DESCRIPTORS: *Rhythm, *Mechanics, Spheres, Bodies of revolution, Theory, Motion, Differential equation, Integration.

A simple method is developed for obtaining upper and lower bounds for the apsidal angle which occurs in the theory of the spherical pendulum. This method is employed to give a quick derivation of the well-known lower and upper bounds of Puiseux and Halphen (respectively) for the apsidal angle. The same method also yields readily the extension of Puiseux's lower bound discovered by W. Kohn. An advantage of the present method is the simplification which arises from eliminating the need for contour integration. The sharpness of the bounds is also demonstrated. (Author)

Aerodynamics and Pneumatics

NASA N63-10800 $0.75

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
LOCAL PRESSURE DISTRIBUTION ON A BLUNT DELTA WING FOR ANGLES OF ATTACK UP TO 35° AT MACH NUMBERS OF 3.4 AND 4.7, by Marvin Kussoy. Dec 62, 22p. 7 refs. Technical note D-1554.

NASA N63-11056 $0.75

Astro Research Corp., Santa Barbara, Calif.
A CONTRIBUTION TO THE THEORY OF FOLDING DEFORMATIONS IN EXPANDABLE STRUCTURES WITH A PARTICULAR APPLICATION TO TOROIDAL SHELLS, by H. U. Schuerch and G. M. Schindler. Rept on Contract NASr-8. Dec 62, 29p. 5 refs. NASA Technical note D-1690.

NASA N62-10653 $2.60

Graduate Aeronautical Labs., Calif. Inst. of Tech., Pasadena.
A 17 INCH DIAMETER SHOCK TUBE FOR STUDIES IN RAREFIED GAS DYNAMICS, by H. W. Liepmann, Anatol Roshko and others, 1961, 28p. refs.

NASA N62-13227 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
AN AUTOMATIC TEMPERATURE-CONTROL SYSTEM FOR WATER-COOLED STRAIN-GAGE WIND TUNNEL BALANCES, by F. J. Walker. Rept. on Contract NAS7-100. 27 Apr 62, 11p. 1 ref. Technical rept. no. 32-228.

NASA N62-12808 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SOUND RADIATION FROM A TURBULENT BOUNDARY LAYER, by John Laufer. Rept. on Contract NASw-6. 1 Nov 61, 17p. 10 refs. Technical rept. no. 32-119.

NASA N63-10967 $4.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
A CRITICAL REVIEW OF EXPERIMENT AND THEORY FOR FLUTTER OF AERODYNAMICALLY HEATED PANELS, by Lawrence D. Guy and Sidney C. Dixon. Oct 62, 47p. 17 refs.

For presentation at the AFOSR and GE Symposium on Dynamics of Manned Lifting Planetary Entry, Philadelphia, Oct 29-31, 1962.

NASA N63-10794 $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
DESCRIPTION AND PRELIMINARY CALIBRATION TESTS OF A SMALL ARC-HEATED HYPERSONIC WIND TUNNEL, by William B. Boatright, Roger B. Stewart, and John E. Grimaud. Dec 62, 36p. 15 refs. Technical note D-1377.

NASA N63-11614 $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AN INTEGRAL EQUATION RELATING THE GENERAL TIME-DEPENDENT LIFT AND DOWNWASH DISTRIBUTIONS OF FINITE WINGS IN SUBSONIC FLOW, by Joseph A. Drischler. Jan 63, 19p. 13 refs. Technical note D-1521.

NASA N62-10618 $1.60

Rosemount Aeronautical Labs., U. of Minnesota, Minneapolis.
STUDY OF REAL GAS EFFECTS, by Rudolph Herman Semi-annual status report no. 3 on Grant NsG-83-60. 10 Nov 61. 48p. 5 refs.

Hydrodynamics, Hydraulics, and Hydrostatics

NASA N63-10889 $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
AN ELECTROMAGNETIC FLOWMETER FOR LOW CONDUCTIVITY FLUIDS, by Niels R. Balling and Benjamin V. Connor. Rept. on Contract NAS7-100. 30 Aug 62, 27p. 19 refs. Technical rept. no. 32-329.

NASA N62-10815 $1.10

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
LAMINAR BOUNDARY LAYER DIFFUSION IN LIQUIDS WITH A VARIABLE DIFFUSIVITY, by Owen T. Hanna. Rept. on Contract NASw-6. 28 Dec 61, 7p. 2 refs. Technical rept. no. 32-204.

NASA N62-10813 $3.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
ON THE DYNAMIC CHARACTERISTICS OF FREE-LIQUID JETS AND A PARTIAL CORRELATION WITH ORIFICE GEOMETRY, by Jack H. Rupe. Rept. on Contract NAS7-100. 15 Jan 62, 34p. 37 refs. Technical rept. no. 32-207.

METALLURGY

ATL-A-127 $2.50

Advanced Technology Labs., Mountain View, Calif.
THERMAL-STRESS-FATIGUE BEHAVIOR OF ZIRCONIUM AND ZIRCONIUM ALLOYS, by K. E. Horton and R. S. Stewart. Final rept. on Contract AT(04-3)-250. 31 Oct 61, 134p. 9 refs.

ANL-FGF-325 $1.60

Argonne National Lab., Ill.
FABRICATION AND PROPERTIES OF US AND TnS BODIES, by P. D. Shalek. Rept. on Contract W31-109-eng-38. 12 June 62, 11p.

ANL-FGF-360 $1.60

Argonne National Lab., Ill.
ON THE USE OF A MODIFIED RADIAL DISTRIBUTION ANALYSIS FOR INDEXING POWDER PATTERNS, by A. F. Berndt. Rept. on Contract W31-109-eng-38. 29 June 62, 12p. 8 refs.

BMI-X-10016 $1.10

Battelle Memorial Inst., Columbus, Ohio.
DEVELOPMENT OF NIOBIUM-BASE ALLOYS FOR USE IN A NUCLEAR SUPERHEATER, by John A. DeMastry and Arthur A. Bauer. Quarterly progress rept. July-Sep 62, on Contract W7405-eng-92. 1 Oct 62, 8p.

BNL-6248 $1.10

Brookhaven National Lab., Upton, N. Y.
THE INFLUENCE OF RADIATION-PRODUCED DEFECTS ON THE PRECIPITATION OF CARBON IN IRON, by F. E. Fujita and A. C. Damask. Rept. on Contract [AT(30-2)GEN-16. 6 Sep 62, 4p.

TID-17006 $4.60

Case Inst. of Tech. Cleveland, Ohio
TRANSFORMATION CHARACTERISTICS OF ZIRCONIUM-NIOBIUM ALLOYS, by D. J. Cometto and R. F. Hehemann. Interim technical rept. no. 2, on Contract AT(11-1)-588. 31 July 59. 41p. 12 refs.

PB 162 573 $1.60

Cryogenic Lab., Ohio State U. Research Foundation, Columbus.
COEFFICIENT OF THERMAL EXPANSION OF SOLIDS AT LOW TEMPERATURE. III. THE THERMAL EXPANSION OF PURE METALS, WITH THE DATA FOR ALUMINUM, NICKEL, TITANIUM, AND ZIRCONIUM, by H. W. Altman, T. Rubin, and H. L. Johnston. Technical rept. no. 27 on Liquid Hydrogen as an Aircraft Fuel, Contract W33-038-ac-14794. 10 Feb 54, 19p 3 refs. Project RF-264; AD-26 970.

DESCRIPTORS: Solids, Metals, *Aluminum, *Nickel, *Titanium, *Zirconium, *Thermal expansion, Tables, Low temperature research.

Thermal expansion coefficients were determined in the interval 20° to 300°K for the 4 pure metals, Al, Ni, Ti and Zr. Values of $-\Delta 1/1_o$ were determined by integration of the smooth curves of a vs T°K. The computed values of the optic constant, D, remained constant to within 0.1 unit for a given alignment of the apparatus. Temperature intervals were accurate to within 0.01°C. (See also PB 160 778)

GEMP-105 $2.60

General Electric Co., Cincinnati, Ohio.
PROPERTIES OF BERYLLIUM INTERMETALLIC COMPOUNDS, by E. A. Aitken and J. P. Smith. Rept. on Contract AT(40-1)2847. July 61, 30p. 6 refs.

HW-SA-2803 $3.60

Hanford Atomic Products Operation, Richland, Wash.
CREEP PROPERTIES OF ZIRCALOY FOR DESIGN APPLICATION, by P. J. Pankaskie. Rept. on Contract AT(45-1)1350. 10 Oct 62, 28p. 8 refs.

HW-SA-2782 $1.60

Hanford Atomic Products Operation, Richland, Wash.
SOME OBSERVATIONS ON THE PROPERTIES OF THE DEFECT PuC PHASE, by J. B. Burnham, Jr. and T. D. Chikalla. Rept. on Contract AT(45-1)1350. 4 Oct 62, 20p. 6 refs.

HW-64684 $9.60

Hanford Atomic Products Operation, Richland, Wash.
URANIUM DIOXIDE FABRICATION, by D. W. Brite and R. J. Anicetti. Rept. on Contract AT(45-1)1350. Dec 60, 117p. 55 refs.

PB 162 414 $7.60

Kaiser Aluminum and Chemical Corp. Spokane, Wash.
THE DEVELOPMENT OF IMPROVED FILLER ALLOYS FOR INERT-GAS TUNGSTEN-ARC WELDING HIGH STRENGTH ALUMINUM ALLOYS, by M. B. Kasen and A. R. Pfluger. Phase rept. no. 2 on Contract DA 04-200-507-ORD-333. 12 May 60, 80p. 4 refs. Interim project rept. no. MS PR 60-50; AD-236 396.

DESCRIPTORS: Welding, *Aluminum alloys, Mechanical properties, *Arc welding, Arc welds, *Welding rods, Tests, Tensile properties

Development is reported of filler alloys for inert-gas W-arc welding of high strength Al alloys 2024-T4, 7075-T6, and 5083-H113. The filler alloys investigated were: (1) an alloy system of parent alloys, (2) Al-Mg-Zn or Al-Zn-Mg systems, and (3) Al-Zn-Mn systems. The mechanical properties of the heat-affected zone which developed in each of the parent alloys were determined. Filler alloys were evaluated by testing all-weld-metal tensile specimens from welds in each parent alloy. Filler alloys were developed which gave all-weld-metal tensile strength ranging from 32,000 to 45,000 psi for 2024-T4 and 31,000 to 52,000 psi for 7075-T6.

PB 162 416 $4.60

Kaiser Aluminum and Chemical Co., Spokane, Wash.
DEVELOPMENT OF IMPROVED FILLER ALLOYS FOR INERT-GAS METAL-ARC WELDING OF HIGH STRENGTH ALUMINUM ALLOYS, by M. B. Kasen and A. R. Pfluger. Phase rept. no. 4 on Contract DA 04-200-507-ORD-333. 6 Oct 60, 42p. 7 refs. Interim project rept. no. MS PR 60-99; AD-243 794.

DESCRIPTORS: Welding, *Aluminum alloys, Mechanical properties, *Arc welding, Arc welds, *Welding rods, Tests, Tensile properties

This report describes the development of improved aluminum filler alloys for joining the high-strength, non-heat-treatable aluminum alloys by the inert-gas metal-arc (MIG) welding process. A total of nine experimental filler alloy compositions were investigated. Seven of these alloys contained magnesium, zinc and manganese as the primary alloying constituents. One of the filler alloys contained merely zinc and manganese as the major alloying elements, and the remaining alloy contained just magnesium and manganese as the major constituents. In MIG weldments in 5083-H113 alloy plate all of the experimental filler compositions produced generally higher transverse tensile properties than are obtained with the conventional filler alloy 5356. Higher transverse tensile strengths were obtained in multiple pass welding of 0.4375-inch or thicker plate than in the single pass welding of 0.250-inch thick 5083-H113 plate. Weldments of zinc-containing filler alloys in 5083 bead plate were found to be susceptible to galvanic and stress corrosion. This disadvantage was not encountered with zinc-free Al-Mg-Mn type filler compositions. (Author) (See also PB 162 415)

PB 162 415 $2.60

Kaiser Aluminum and Chemical Corp. Spokane, Wash.
EFFECT OF FILLER ALLOY COMPOSITION ON THE STRESS CORROSION RESISTANCE OF 5083-H113 TIG WELDMENTS, by T. J. Summerson. Phase rept. no. 3 on Contract DA 04-200-507-ORD-333. 22 June 60, 26p. 1 ref. Interim project rept. no. MS PR 60-60; AD-239 168.

DESCRIPTORS: *Aluminum alloys, *Arc welds, *Corrosion, Stresses, *Zinc alloys, Magnesium alloys, Welding rods, Mechanical properties, Tungsten, Manganese alloys, Chromium alloys, Titanium alloys

Data presented show that 5083 weldments made with zinc-containing filler alloy are susceptible to stress corrosion cracking and to galvanic corrosion in the weld. Stress corrosion susceptibility increases with an increase in the zinc or combined zinc plus magnesium content present in the filler alloy composition. Data also show that 5083 weldments made with a zinc-free filler alloy are not susceptible to stress corrosion or to galvanic corrosion and possess strengths equivalent to that of 5083 weldments made with zinc-containing filler alloys. (Author) (See also PB 162 414)

TID-16721 $1.60

Knolls Atomic Power Lab., Schenectady, N. Y.
MEASUREMENT OF THERMAL DIFFUSIVITY IN SMALL SPECIMENS, by A. E. Powers. Rept. on Contract [W31-109-eng-52.] [20 Aug 62], 17p.

KAPL-M-RXH-1 $1.10

Knolls Atomic Power Lab., Schenectady, N. Y.
MANUFACTURING ZIRCALOY RHOMBIC RODS, by R. A. Hamberger and B. Dobies. Rept. on Contract W-31-109-eng-52. 1 Oct 62, 9p.

NASA N63-10799 $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
VARIABLE-AMPLITUDE FATIGUE TESTS WITH PARTICULAR ATTENTION TO THE EFFECTS OF HIGH AND LOW LOADS, by Eugene C. Naumann. Dec 62, 25p. 12 refs. Technical note D-1522.

UCRL-6655-T $1.10

Lawrence Radiation Lab., U. of California, Livermore.
THE DIFFUSION OF COBALT IN PURE ALPHA IRON, by Richard J. Borg and David Y. F. Lai. Rept. on Contract W7405-eng-48. [1961] 8p. 6 refs.

UCRL-10356 $1.50

Lawrence Radiation Lab., U. of California, Berkeley.
YIELDING AND PLASTIC FLOW OF POLYCRYSTALLINE NIOBIUM, by Lenon Ivan Van Torne. Master's thesis. Rept. on Contract W-7405-eng-48. Aug 62, 68p. 27 refs.

NASA N63-10898 $1.00

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
PRELIMINARY INVESTIGATION OF EFFECT OF HYDROGEN ON STRESS-RUPTURE AND FATIGUE PROPERTIES OF AN IRON-, A NICKEL-, AND A COBALT-BASE ALLOY, by Stanley J. Klima, Alfred J. Nachtigall, and Charles A. Hoffman. Dec 62, 36p. 16 refs. Technical note D-1458.

TID-11153 $2.60

Los Alamos Scientific Lab., N. Mex.
ELECTROPHORETIC DEPOSITION: A VERSATILE COATING METHOD, by Conrado P. Gutierrez, John R. Mosley, and Terry C. Wallace. Rept. on Contract [W7405-eng-36] 25p. LADC-4381.

TID-11432 $1.60

Los Alamos Scientific Lab., N. Mex.
SOME PRELIMINARY METALLOGRAPHIC STUDIES OF MATERIALS FOR USE ABOVE 2500°C, by C. G. Hoffman. Rept. on Contract [W7405-eng-36] 12p. LADC-4259

NASA N62-10671 $2.60

Massachusetts Inst. of Tech., Cambridge.
OXIDE REFRACTORINESS IN DISPERSION STRENGTHENED COPPER AND NICKEL ALLOYS, by Pawel Predecki and Nicholas J. Grant. Rept. on Grant NsG-117-61. 1962, 21p. 7 refs.

DP-418 $4.60

Savannah River Lab., Aiken, S. C.
ULTRASONIC ENERGY APPLIED TO ALUMINUM EXTRUSION CLADDING OF TUBES, by J. Byron Jones, Carmine F. DePrisco, and others. Rept. on Contract AT(07-2)1. Nov 59, declassified 16 Nov 62. 48p. 4 refs.

Ferrous Metals

ATL-A-130 $1.10

Advanced Technology Labs., Mountain View, Calif.
INVESTIGATION OF THERMAL-STRESS-FATIGUE BEHAVIOR OF STAINLESS STEELS, by K. E. Horton. Quarterly technical progress rept. Jan-Mar 62, on Contract AT(04-3)250. 6p. EURAEC-336.

ATL-A-131 $1.60

Advanced Technology Labs., Mountain View, Calif.
INVESTIGATION OF THERMAL-STRESS-FATIGUE BEHAVIOR OF STAINLESS STEELS, by K. E. Horton. Quarterly technical progress rept. Apr-June 62, on Contract AT(04-3)250. 13p. 2 refs. EURAEC-335.

Nonferrous (except light) Metals

UCRL-10398 $1.25

Lawrence Radiation Lab., U. of California, Berkeley.
ON THE NATURE OF DISPERSED PARTICLE STRENGTHENING AT LOW TEMPERATURES, by Jack Blake Mitchell. Master's thesis. Rept. on Contract W7405-eng-48. Aug 62, 34p.

ANL-FGF-385 $3.60

Argonne National Lab., Ill.
THE CORROSION OF 1100 ALUMINUM IN OXYGEN SATURATED WATER AT 70°C, by J. E. Draley, Shiro Mori, and R. E. Loess. Rept. on Contract W31-109-eng-38. 23 Aug 62, 32p. 6 refs.

KAPL-M-WKA-16 $4.60

Knolls Atomic Power Lab., Schenectady, N. Y.
EFFECT OF A. C. HEATING OF ZIRCALOY CORROSION SPECIMENS IN STAINLESS STEEL LOOPS, by W. Kermit Anderson and Craig Cheng. Rept. on Contract W-31-109-eng-52. 11 Sep 62, 41p. 7 refs.

KAPL-M-LRM-2 $1.10

Knolls Atomic Power Lab., Schenectady, N. Y.
STATIC SODIUM CORROSION TESTS OF CERAMIC MATERIALS, by L. R. McCreight. Rept. on Contract [W31-109-eng-52]. 6 July 51, declassified 3 June 57. 5p.

LAMS-2756 $0.50

Los Alamos Scientific Lab., N. Mex.
PREPARATION OF NEPTUNIUM-237 METAL, by A. N. Morgan, K. W. R. Johnson, and J. A. Leary. Rept. on Contract W-7405-eng-36. 5 Sep 62, 13p. 6 refs.

PB 162 618 $3.60

Minnesota U. [Minneapolis].
EFFECT OF PRIOR CREEP ON THE REVERSED STRESS FATIGUE PROPERTIES OF TEMPERATURE RESISTANT ALLOYS, by Franz H. Vitovec and Benjamin J. Lazan. Rept. for Jan 54-June 55, on Materials Analysis and Evaluation Techniques, Contract AT 33(616)2803. Sep 55, 33p. 13 refs. WADC Technical note 55-460; AD-88 762.

DESCRIPTORS: *Heat resistant alloys, Fatigue (Mechanics) Stresses, *Creep, Rupture, Deformation, Mechanical properties, Microstructure

The purpose of this work was to investigate the effect of prior creep on the fatigue properties of the temperature resistant alloys, N-155, S-816, and Stellite 21. In order to separate the effects of stress, time, and temperature variables, four different types of tests have been performed: conventional axial reversed stress fatigue tests, creep tests, Prot tests with specimens aged unstressed for various times, and Prot tests with specimens which were subjected to various amounts of creep prestrain. Increasing amounts of prior creep caused first a slight increase and then a rapid decrease of the Prot fatigue strength of N-155 and S-816. For Stellite 21, the Prot failure stress decreased continuously with increasing prestrain due to aging effects during the creep prestrain. The criterion found to most accurately predict fatigue damage was the percent creep rather than the state of creep. (Author)

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

TID-16727 $1.10

Argonne National Lab., Ill.
CALCULATION OF REDUCED WIDTHS FROM RESONANT SCATTERING OF PROTONS BY A DIFFUSE POTENTIAL, by J. P. Schiffer. June 62, 4p. 5 refs.

ANL-6613 $0.50

Argonne National Lab., Ill.
TABLE OF TRIM DISCRETE QUADRATURE PARAMETERS FOR THIN BINARY SLAB CELLS, by David Meneghetti. Rept. on Contract W-31-109-eng-38. Sep 62, 10p. 3 refs.

TID-17308 $10.10

Babcock and Wilcox Co., Lynchburg, Va.
STUDY S-R-118. CLOSED-LOOP ANALOG STUDY FOR THE ADVANCED TEST REACTOR. Rept. on Contract AT(10-1)1075. Sep 62, 120p.

TID-17083 $4.60

Bartol Research Foundation, Swarthmore, Pa.
STUDIES RELATING TO SCATTERING OF NEUTRONS AND APPLIED PHENOMENA, by D. M. Van Patter. Annual progress rept. for 1962, on Contract AT(30-1)-1679. 31 Oct 62, 43p. 36 refs.

BMI-X-10017 $1.60

Battelle Memorial Inst., Columbus, Ohio.
FISSION-PRODUCT RELEASE FROM FUEL-ELEMENT CLADDINGS, by Fitz R. Winslow, Thomas S. Elleman, and others. Quarterly progress rept. July-Sep 62, on Contract W7405-eng-92. 1 Oct 62, 10p.

WAPD-TM-324 $0.50

Bettis Atomic Power Lab., Pittsburgh, Pa.
ANALYSIS OF THE NEUTRON CAPTURE CROSS SECTION AND RESONANCE INTEGRAL OF HAFNIUM, by I. Itkin. Rept. on Contract AT(11-1)-GEN-14. Aug 62, 19p. 26 refs.

BNL-6510 $5.60

Brookhaven National Lab., Upton, N. Y.
BROOKHAVEN CHEMO-NUCLEAR IN-PILE RESEARCH LOOP, by Meyer Steinberg, Walter Tucker and others. Oct 62, 56p.

BNL-6512 $14.00

Brookhaven National Lab., Upton, N. Y.
FUTURE PROGRAM FOR THE CERN PS AND THE BROOKHAVEN AGS. Minutes of a meeting held Sep 10-14, 1962, at Brookhaven National Laboratory, comp. by J. W. Bittner, H. N. Brown and A. W. Maschke. 200p.

GA-3122 $1.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
NEUTRON THERMALIZATION a la MODE, by Mark Nelkin. Rept. on Contract AT(04-3)-167. 25 Apr 62, 17p. 25 refs.

APEX-652 $3.60

General Electric Co., Cincinnati, Ohio.
HAND CALCULATION OF NEUTRON FLUX, by J. T. Lence, R. R. Liguori, and Andrew Lowery. Rept. on Contracts AT(11-1)171 and AF 33(600)38062. July 61, declassified 1 Nov 62. 35p. 6 refs.

HW-SA-2633 $1.60

Hanford Atomic Products Operation, Richland, Wash.
PEROXYACETATE SEPARATION OF CERIUM(IV) FROM TRIVALENT RARE EARTHS IN PUREX PROCESS SOLUTIONS, by L. F. Lust and H. H. Van Tuyl. Rept. on Contract AT(45-1)1350. 26 Mar 62, 17p.

KAPL-M-EJB-1 $6.60

Knolls Atomic Power Lab., Schenectady, N. Y.
ETC4A - A ONE DIMENSIONAL MONOENERGETIC TRANSPORT PROGRAM, by E. J. Brooks, Jr. Rept. on Contract W-31-109-eng-52. 8 Aug 62, 68p. 2 refs.

KAPL-M-BM-2 $6.60

Knolls Atomic Power Lab., Schenectady, N. Y.
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PB 162 443 $3.60

Naval Radiological Defense Lab., San Francisco, Calif.
RADIOLOGICAL DEFENSE MEASURES AS A COUNTERMEASURE SYSTEM, by W. E. Strope. 15 Feb 56, 31p. 5 refs. Research and development technical rept. USNRDL-TR-74.

DESCRIPTORS: *Radiological warfare, Defense systems *Passive defence, Countermeasures, Shelters.

The importance of considering radiological defense measures as an interrelated system rather than as a collection of individual measures is emphasized. In discussing the radiological defense system, the defense problem is divided into three time phases: emergency, operational recovery and final recovery. The objectives and measures of effectiveness in each phase are discussed. Countermeasures are classified as to type. The concept of a central countermeasure type in each phase is introduced. Central countermeasures are selected and their interactions are discussed. It is concluded that failure to recognize the interactions between countermeasures is resulting in development of countermeasures on incompatible grounds. (Author)

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PROGRESS REPORT, JANUARY-MARCH 1962. Rept. on Contract AT(30-1)GEN-72. 24 Sep 62, 74p.

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NORA PROJECT PROGRESS REPORT, DECEMBER 1961 JUNE 1962. Rept. on Contract AT(30-1)2760. June 62, 13p.

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JLI-2748-0-5 $2.75

Johnston William H., Labs., Inc., Baltimore, Md.
BASIC AND APPLIED RADIOTRACER STUDIES. Annual rept. on Contract AT(30-1)-2748. June 62, 164p. 9 refs.

TID-17240 $1.60

Knolls Atomic Power Lab., Schenectady, N. Y.
PRECISE CRITICALITY DETERMINATIONS IN THE SOLID HOMOGENEOUS ASSEMBLY, by F. Feiner, S. Weinstein, and others. [9 Nov 62] 11p. 5 refs.

TID-6135 $2.60

Knolls Atomic Power Lab., Schenectady, N. Y.
RELIEF AND SAFETY VALVES FOR NUCLEAR SERVICE, by Bert S. Kosut. Rept. on Contract W31-109-eng-52.] 26 Apr 60, 20p. 9 refs.

UCRL-10132 $0.50

Lawrence Radiation Lab., U. of California, Berkeley.
BEVATRON INDUCTION ELECTRODES, by Fred H. G. Lothrop. Rept. on Contract W-7405-eng-48. 9 July 62, 18p. 3 refs.

UCID-4171 $1.60

Lawrence Radiation Lab., U. of California, Livermore.
HOT BOX FUEL ELEMENT WEIGHTS: 2-Mil FOILS. HOT BOX NOTE NUMBER 29, by R. G. Finke. Rept. on Contract [W7405-eng-48.] 29 June 60, 8p.

UCRL-7036(Pt. 8) $3.60

Lawrence Radiation Lab., U. of California, Livermore.
PLUTO REACTOR TEST FACILITY - SITE 401. PART 8 OF THE TORY II-C PROGRAM, by William C. Miller. Rept. on Contract W-7405-eng-48. 5 Sep 62, 33p. 7 refs.

UCRL-6942 $0.50

Lawrence Radiation Lab., U. of California, Livermore.
A SELF-CONSISTENT DISTRIBUTION OF ELECTRONS IN THE ASTRON E-LAYER, by Warren Heckrotte and Kelvin Neil. Rept. on Contract W-7405-eng-48. 8 June 62, 20p. 7 refs.

UCRL-7036(Pt. 5) $5.60

Lawrence Radiation Lab., U. of California, Livermore.
TORY II-C CONTROLS SYSTEM. PART 5 OF THE TORY II-C PROGRAM, by E. A. Sheridan, J. A. Day and others. Rept. on Contract W-7405-eng-48. 20 Sep 62, 60p.

UCID-4170 $1.10

Lawrence Radiation Lab., U. of California, Livermore
ZOOM CALCULATIONS OF HOT BOX. HOT BOX NOTE NUMBER 28, by R. Freis. Rept. on Contract [W7405-eng-48]. 23 June 60, 9p.

LA-2746 $1.25

Los Alamos Scientific Lab., N. Mex.
FAST REACTOR ROCKET ENGINES--HEAT TRANSFER, by Ralph S. Cooper. Rept. on Contract W-7405-eng-36. June 62, 51p. 12 refs.

LA-2733 $2.00

Los Alamos Scientific Lab., N. Mex.
A PRELIMINARY EVALUATION OF FAST OXIDE BREEDER REACTORS FOR SEA WATER CONVERSION, by Alexander Sesonske and R. Philip Hammond. Rept. on Contract W-7405-eng-36. Aug 62, 80p. 21 ref

LAMS-2259 $3.60

Los Alamos Scientific Lab., N. Mex.
SOME REACTOR PHYSICS IN THE ROVER PROJECT, by C. B. Mills. Rept. on Contract W7405-eng-36. Sep 58 declassified 5 Nov 62. 40p. 2 refs.

LAMS-2782 $0.50

Los Alamos Scientific Lab., N. Mex.
ULTRA HIGH TEMPERATURE REACTOR EXPERIMENT (UHTREX). Status rept. for period ending 20 Sep 62, on Contract W-7405-eng-36. 31 Oct 62, 21p.

MND-P-2640 $5.60

Martin Marietta Corp., Baltimore, Md.
INSTRUCTION MANUAL. SNAP-7C ELECTRIC GENERATION SYSTEM. Rept. on Contract AT(30-3)-217. 25 Oct 61, 64p.

MND-MD-2542 $15.00

Martin Marietta Corp., Baltimore, Md.
PM DEVELOPMENT--TASK 5.0 HEAT TRANSFER TESTS. AN EXPERIMENTAL, TWO-PHASE FLOW PRESSURE DROP STUDY, by J. J. Jicha, R. Lightner and others. Rept. on Contract AT(30-1)-2706. Sep 62, 223p. 26 refs.

MND-M-1825 $8.10

Martin Marietta Corp., Baltimore, Md.
PM-1 NUCLEAR POWER PLANT PROGRAM. Quarterly progress rept. no. 14, 1 June-31 Aug 62, on Contract AT(30-1)-2345. Sep 62, 82p.

MND-P-2483-4 $9.10

Martin Marietta Corp., Baltimore, Md.
SNAP 7 PROGRAM. TASK 8--STRONTIUM-90 FUELED THERMOELECTRIC GENERATOR DEVELOPMENT. Quarterly progress rept. no. 4, 1 Aug-31 Oct 61, on Contract AT(30-3)-217. [1961] 115p. 8 refs.

MND-P-2707 $10.10

Martin Marietta Corp., Baltimore, Md.
STRONTIUM-90 FUELED THERMOELECTRIC GENERATOR POWER SOURCE. FIVE-WATT U. S. NAVY WEATHER STATION. Final rept. on Contract AT(30-3)-217. 26 Feb 62, 129p. 12 refs.

MND-P-2679 $16.00

Martin Marietta Corp., Baltimore, Md.
THERMIONIC ISOTOPIC POWER SYSTEM, by William E. Kortier and Thomas S. Bustard. Final summary rept. 1 July 60-30 Sep 61, on Contract AT(30-3)-217. [1961] 242p. 56 refs.

NYO-9888 $10.50

Nuclear Engineering Lab., Catholic U. of America, Washington, D. C.
LIMITING FACTORS IN THE RAPID IDENTIFICATION OF SELECTED MATERIALS BY NUCLEAR TECHNIQUES, by Howard D. Jordan. Annual progress rept. May 60-July 61, on Contract AT(30-1)2586. Aug 61, declassified 18 Sep 62. 134p. 24 refs. CUA-NE-16.

NMI-4313 (Pt. I) $11.00

Nuclear Metals, Inc., Concord, Mass.
FABRICATION AND PROPERTIES OF EXTRUDED URANIUM TUBES, by J. L. Klein, J. M. Fitzpatrick and others. Rept. on Contract AT(30-1)-1565. 30 Sep 59, declassified 7 Sep 62. 142p.

ORNL-TM-387 $9.10

Oak Ridge National Lab., Tenn.
AN ECONOMIC STUDY OF A 1000 MEGAWATT HOMOGENEOUS REACTOR, by R. H. Ball, A. M. A. M. Hallene, and R. J. March. Rept on Contract W 7405-eng-26. 19 Aug 52, declassified 15 May 62. 104p.

ORNL-TM-386 $2.60

Oak Ridge National Lab., Tenn.
SEALS AND PACKING MATERIALS FOR MOLTEN FLUORIDE SALTS, by W. C. Tunnell. Rept. on Contract W7405-eng-26 [1952] declassified. 22p. 4 refs.

ORNL-TM-397 $2.60

Oak Ridge National Lab., Tenn.
TIME-DEPENDENT RELEASE OF GASEOUS MATERIAL FROM A THREE-BARRIER REACTOR CONTAINMENT SYSTEM, by Truman D. Anderson. Rept. on Contract W-7405-eng-26. 16 Nov 62, 27p.

PRDC-TR-58 $1.60

Power Reactor Development Co., Detroit, Mich.
MONTHLY TECHNICAL REPORT, APRIL 1962, Rept. on Contract AT(11-1)-476. 3 Oct 62, 20p.

SC-4737(M) $0.75

Sandia Corp., Albuquerque, N. Mex.
THE SANDIA PULSED REACTOR FACILITY (SPRF), by P. D. O'Brien. Rept. on Contract AT(29-1)789. Oct 62, 41p.

SL-1949 $2.25

Sargent and Lundy, Chicago, Ill.
ENGINEERING EVALUATION STUDIES, HEAVY WATER MODERATED POWER REACTOR PLANTS, by W. A. Chittenden and G. F. Hoveke. Rept. on Contract AT (38-1)213. 30 June 62, 99p. 7 refs.

SL-1974-1 $0.75

Sargent and Lundy, Chicago, Ill.
ENGINEERING EVALUATION STUDIES, HEAVY WATER MODERATED POWER REACTOR PLANTS. Quarterly progress rept. for Apr-June 62, on Contract AT(38-1)213. 16 July 62, 29p. 17 refs.

SL-1974-2 $1.60

Sargent and Lundy, Chicago, Ill.
ENGINEERING EVALUATION STUDIES HEAVY WATER MODERATED POWER REACTOR PLANTS. Quarterly progress rept. July-Sep 62, on Contract AT(38-1)-213. 23 Oct 62, 13p.

SRO-74 $1.60

Savannah River Operations Office, Atomic Energy Commission, Augusta, Ga.
HEAVY WATER POWER REACTOR PROGRAM. Monthly progress rept. Oct 62. 13p.

NAA-SR-6304 $11.00

Thompson Ramo Wooldridge Inc., Cleveland, Ohio.
THE SNAP II POWER CONVERSION SYSTEM. BOILER DEVELOPMENT, by R. G. Gido, A. Koestel, and others. Topical rept. no. 12, on Contract AT(11-1)GEN-8. 17 July 61, 146p. TRW rept. no. ER-4521.

UNC-5021 $1.50

United Nuclear Corp., White Plains, N. Y.
A SURVEY OF COOLANT VAPORIZATION EFFECTS IMPORTANT TO FAST REACTOR SAFETY, by Arthur J. Goldman. Rept. on Contract AT(30-1)-2832. 30 June 62, 56p. 54 refs.

UNC-5001 $1.60

United Nuclear Corp., White Plains, N. Y.
TWO-PHASE FLOW PATTERNS WITH HEAT ADDITION. Progress rept. for 5 Sep-31 Dec 61, on Contract AT(30-1)2876. 15 Jan 62, 22p. EURAEC-257.

UNC-5009 $2.60

United Nuclear Corp., White Plains, N. Y.
TWO-PHASE FLOW PATTERNS WITH HEAT ADDITION. Progress rept. for 1 Jan-31 Mar 62, on Contract AT(30-1)2876. 15 Apr 62, 27p. 2 refs. EURAEC-316.

GEAP-3937 $2.00

Vallecitos Atomic Lab., San Jose, Calif.
AN ANALYSIS OF METHODS IN CONTROL ROD THEORY AND COMPARISONS WITH EXPERIMENT, by G. H. Kear and M. H. Ruderman. Rept. on Contract AT(04-3)-189. 27 May 62, 82p.

GEAP-4019 $2.25

Vallecitos Atomic Lab., San Jose, Calif.
AN EXPERIMENTAL PARAMETRIC STUDY OF THE EFFECTS OF CONTROL RODS ON THE PROMPT NEUTRON DECAY CONSTANT IN MULTIPLYING MEDIA, by P. Meyer and W. C. Ballowe. Rept. on Contract AT(04-30)-189. Apr 62, 99p. 12 refs.

GEAP-4032 $1.75

Vallecitos Atomic Lab., San Jose, Calif.
VIBRATIONAL COMPACTION OF URANIUM DIOXIDE, by W. R. DeHollander. Rept. on Contract AT(04-3)-361. 1 Mar 62, 75p. 4 refs.

WCAP-1900 (Addendum) $1.10

Westinghouse Electric Corp., Pittsburgh, Pa.
THERMOELECTRIC NUCLEAR FUEL ELEMENT. Addendum to final rept. on Contract AT(30-3)-500. 30 Mar 62, 10p.

Nuclear Reactions

TID-16746 $1.10

Argonne National Lab., Ill.
THE (d, p) REACTION AT 21.4 Mev DEUTERON ENERGY, by J. L. Yntema. Rept. on Contract [W31-109-eng-38.] June 62, 4p. 4 refs. UAC-6524.

TID-16745 $1.10

Argonne National Lab., Ill.
RECOIL STUDIES OF NUCLEAR REACTIONS INDUCED BY HIGH-ENERGY PROTONS AND ALPHA PARTICLES, by Lester Winsbert. Rept. on Contract W31-109-eng-38 June 1962, 7p. 2 refs.

UCRL-10225 $1.60

Lawrence Radiation Lab., U. of California, Berkeley.
K^+NUCLEON INTERACTION III. PION PRODUCTION BY K^+ MESONS ON HYDROGEN AND DEUTERIUM, by H. F. Fisk, H. K. Ticho and others. on Contract [W7405-eng-48] 1 June 62, 17p. 9 refs.

LAMS-2740 $1.50

Los Alamos Scientific Lab., N. Mex.
THE SCATTERING OF NON-RELATIVISTIC SYSTEMS WITH ARBITRARY SPIN, by Arthur Kerman. Rept. on Contract W-7405-eng-36. 15 Sep 61, 65p.

TID-16552 $4.60

Northeastern U., Boston, Mass.
THE THEORY OF INELASTIC PROTON-DEUTERON SCATTERING, by Alan H. Cromer. [1962] 44p. 13 refs

TID-14822 $10.50

Oak Ridge National Lab., Tenn.
A STUDY OF THE REACTIONS, $Be^9(He^3, n)C^{11}$, $Li^7(He^3, n)B^9$ AND $C^{13}(He^3, n)O^{15}$, BY TIME-OF-FLIGHT TECHNIQUES, by Jerome Lewis Duggan. Doctoral thesis. Rept. on Contract [W7405-eng-26]. Feb 61, 135p. 95 refs.

TID-16558 $2.60

Yale U., New Haven, Conn.
π^+ - p INTERACTIONS NEAR 1 Bev, by H. Foelsche, E. C. Fowler, and others. 18 June 62, 26p. 8 refs. Prepared in cooperation with Brookhaven National Lab. Upton, N. Y.

Radioactivity

TID-14880 $7.60

Vienna U. (Austria)
INVESTIGATION OF THE DECAY OF Tl-210 (RaC"), by Georg Stetter. Final report on Contract AT(30-1) 2637 [1961]. 72p. 25 refs.

PB 162 368 $2.60

[Defense Atomic Support Agency] Washington, D. C.
DOSAGE AND DOSE-RATE CURVES OF RESIDUAL RADIOACTIVITY BASED ON MULTIPLE DECAY OF GROSS FISSION PRODUCT AND RADIATION INTENSITY CHARTS FOR RADIUM AND COBALT 60 CALIBRATION SOURCES. Revised Sep 52, 23p. AFSWP 99; AD-94 391.

DESCRIPTORS: Radioactivity, *Dose rate, Dosage, *Radium, *Cobalt, *Radioactive decay, Fission products, Calibration, Nomographs.

TID-17087 $1.60

General Mills Electronics Group, Minneapolis, Minn.
LETTER PROGRESS REPORT FOR AUGUST AND SEPTEMBER 1962, on Contract AT(11-1)-401. 12Oct62, 16p.

UCRL-10434 $0.50

Lawrence Radiation Lab., U. of California, Berkeley.
THEORY OF ALPHA DECAY, by W. Tobocman. Rept. on Contract W-7405-eng-48. Aug 62, 14p. 3 refs.

Waste Disposal

NYO-8102 $8.60

Chesapeake Bay Inst., Johns Hopkins U., Annapolis, Md.
A STUDY OF THE MOVEMENT AND DIFFUSION OF AN INTRODUCED CONTAMINANT IN NEW YORK HARBOR WATERS, by D. W. Pritchard, Akira Okubo, and Emanuel Mehr. Rept. on Contract AT(30-1)-1477. Oct 62, 95p. 13 refs. Technical rept. 31; Reference 62-21.

HW-72335(Pt. 1) $0.75

Hanford Atomic Products Operation, Richland, Wash.
STEADY DARCIAN TRANSPORT OF FLUIDS IN HETEROGENEOUS PARTIALLY SATURATED POROUS MEDIA. PART 1. MATHEMATICAL AND NUMERICAL FORMULATION, by R. W. Nelson. Rept. on Contract AT(45-1)-1350. June 62, 30p. 17 refs.

PB 162 615 $13.00

Pfaudler Permutit, Inc., Rochester, N. Y.
DISPOSAL OF RADIOACTIVE WASTES FROM NUCLEAR REACTORS IN THE ARCTIC. Final engineering rept. on Contract AF 39(602)2011. Apr 60, 187p. 141 refs. RADC-TR-60-114; AD-240 060.

DESCRIPTORS: Radioactive waste, Arctic regions, *Nuclear power plants, Design, Bibliography, Pressurized water reactors, *Boiling water, *Radioactive waste disposal, Nuclear reactors.

Handling and disposal of radioactive wastes from 0.5 to 70 eMw nuclear power reactors operating in arctic regions were studied. Pressurized and boiling water reactors were the principal types covered. Results of the study will be used in design and selection policies concerning military applications of nuclear reactors in the Arctic. Literature on radioactive waste disposal, the Arctic, and power reactor wastes was reviewed. Waste disposition based on technical and economic evaluations, and consistent with current regulations, was resolved. Liquid waste effluents from the reactor and resulting from operating procedures are a high-active, high-purity stream, to be decontaminated by demineralization, and a low-active, low-purity waste, to be decontaminated by demineralization or evaporation, the former being preferred for small reactors. Non-active diluent wastes are to be fully used for dispersal, this being dependent on local water supply. Spent resins from primary coolant and waste treatment demineralizers, evaporator sludges, incinerator ashes, and other solids are the radioactive wastes to be transported from the reactor site for ultimate disposal. Suggestions are made for use of unique features of the Arctic for local waste disposal, and recommendations for future related studies are included. (Author)

PHYSICS

ARF-3187-9 $1.10

Armour Research Foundation, Chicago, Ill.
ELECTROSTATIC CLASSIFICATION OF SUBMICRON AIRBORNE PARTICLES. Progress rept. 1 Aug-1 Oct 62, on Contract AT(11-1)-578. 9p. 2 refs.

NASA N62-11534 $5.60

Electro-Optical Systems, Inc., Pasadena, Calif.
EXPERIMENTAL INVESTIGATION FOR OBTAINING STABLE NEGATIVE IONS, by J. M. Teem and D. E. Zuccaro. Quarterly progress rept. no. 3, 6 Mar-6 June 61, on Contract NAS5-604. 16 June 61, 65p. EOS rept. no. 1581-QF-3.

NASA N62-11535 $8.10

Electro-Optical Systems, Inc., Pasadena, Calif.
EXPERIMENTAL INVESTIGATION FOR OBTAINING STABLE NEGATIVE IONS, by W. D. Dong, W. D. Kilpatrick, and others. Quarterly progress rept. no. 4, 6 June-6 Sep. 61, on Contract NAS5-604. 16 Sep. 61, 86p. 6 refs. EOS rept. no. 1581-QF-4.

NASA N62-11533 $3.60

Electro-Optical Systems, Inc., Pasadena, Calif.
NEGATIVE ION BEAMS, by W. D. Kilpatrick and J. H. Mullins. Quarterly progress rept. no. 1, 6 June-6 Sep. 61, on Contract NAS5-604. 16 Sep 61, 31p. EOS rept. no. 1982-Q-1.

PB 162 425 $1.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
A GENERAL COMPARISON BETWEEN PIEZOELECTRIC AND PIEZOMAGNETIC MATERIALS AS HIGH POWER ELECTRICAL ENERGY SOURCES, by Kenneth D. George and J. William Doremus. Aug 58, 11p. 3 refs. Rept. no. ORDBB-TK-233.

DESCRIPTORS: *Piezoelectric materials, *Magnetic materials, *Ferroelectric materials, Ceramic materials, Power supplies, Generators, Electromagnetic pulses.

A simplified model of a piezomagnetic generator, consisting of a coil wound on a magnetized core, is analyzed and comparisons are made with a piezoelectric generator. Expressions for the electrical energy per unit volume of the core material and of the piezoelectric material that can be delivered to a resistive load are obtained. Numerical values for energy per unit volume of a number of existing materials are tabulated. Piezoelectric materials appear to be superior to magnetic materials in this respect. Approximate design formulae for piezomagnetic generators are also given. (Author)

COO-1019 $4.60

Illinois U. Engineering Experiment Station, Urbana.
FACTORS IN AGGLOMERATION OF SOLID AEROSOL PARTICLES, by Kingsley Kay and H. F. Johnstone. Technical rept. no. 17 (Final) on Contract AT(11-1)-276. 1 Sep 62, 45p. 12 refs.

LA-2715 $1.50

Los Alamos Scientific Lab., N. Mex.
THE SCATTERING OF ELECTROMAGNETIC WAVES BY NON-EQUILIBRIUM PLASMAS, by George L. Lamb, Jr. Rept. on Contract W-7405-eng-36. 1 Mar 62, 64p. 27 refs.

K-1543 $1.60

Oak Ridge Gaseous Diffusion Plant, Tenn.
GAS MASS FLOW MEASUREMENTS ACCURATE TO ONE-TENTH PERCENT, by E. C. Evans and G. W. Ray. 6 Sep 62, 21p. 9 refs.

Acoustics

AD-280 182 $1.60

Naval Research Lab., Washington, D. C.
THE THEORY OF MODAL IMPEDANCES OF TRANSDUCER SURFACES RADIATING SOUND INTO THE FAR FIELD, by S. Hanish. Interim rept. 27 Mar 62, 16p. 4 refs. NRL rept. 5750.

DESCRIPTORS: *Transducers (Acoustic), *Acoustic impedance, Impedance, *Sound transmission, Mechanical waves, Wave analysis, Theory

The theory of modal mechanical radiation self-impedance is generalized to apply to any coordinate system in which the Helmholtz wave equation is separable. Formulas for obtaining modal velocities and modal powers are are derived and discussed for spherical, spheroidal, and cylindrical systems. The entire analysis is then repeated to include the phenomenon of modal mutual impedances between separate sound sources in an arbitrary baffle. Several example formulas of modal impedances and velocities are explicitly reviewed. (Author)

OTS SB-500 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
ULTRASONICS (SUPPLEMENT TO CTR-288). Sep 62, 26p. 524 refs. OTS Selective Bibliography SB-500.

DESCRIPTORS: *Ultrasonics, *Ultrasonic radiation, Medical equipment, Biology, Non-destructive testing, Cleaning, Welding, Metallurgy, Radiation effects *Bibliography
Lists 524 reports and translations added to the OTS collection during the period 1957 to September 1962. Material is listed in the following categories: Ultrasonics in Medicine and Biology, Nondestructive Testing, Ultrasonic Cleaning, Ultrasonic Welding, Ultrasonics in Metallurgy, Ultrasonics and Ultrasonic Radiation General, and AEC Reports on Ultrasonics. Covers research on ultrasonic diagnosis of tumors, frostbite therapy, effects on man; inspection and testing of adhesive bonds, tubing, forgings, foamed-in-place resins; ultrasonic cleaning, ultrasonic cold welding; ultrasonic machining and grinding of super alloys and microminiature equipment; ultrasonic extrusion and casting; fabric dying; fuel foam control and dust precipitation among other subjects. (Author)

PB 162 565 $4.60

Technical Operations, Inc., Burlington, Mass.
DESIGN, DEVELOPMENT AND CONSTRUCTION OF A FLUID ACOUSTIC FILTER, PHASES II AND III, by F. Everett Reed, James H. Farrell, and Ralph A. Bianchi. Rept. on Contract NObs-72330. June 58, 48p. Rept. no. TOI 58-21; AD-206 508.

DESCRIPTORS: Acoustic equipment, *Acoustic filters, *Filters (Fluid), Design, Construction, Tests, *Submarine noise, Noise, Attenuation, Pipes, Statics, Dynamics, Instrumentation.

Two test units were constructed, one to evaluate filters under conditions of flow, and the other to evaluate them under pressure. Satisfactory measurements were made in the dynamic system, but in the high pressure static system, the measurements were unsatisfactory for several reasons, one of which was the existence of large sound reflections in the piping system that set up severe standing waves and made attenuation measurements almost meaningless. Some general conclusions were as follows: (1) pressure release wall filters are, by themselves, excellent noise attenuators and can give attenuations on the order of 60 db if the sound is not short circuited around them; (2) pressure release devices such as the Westinghouse desurger give much less attenuation (approximately 25 db) than the pure sound soft wall filter, primarily because the sound bypasses the pressure release mechanism and passes through the metal container; (3) the attenuation characteristics of the double-expansion chamber filter were better than the theory predicted; and (4) it is essential that when the attenuation of a filter is being measured, the sound pick-ups be moved up and down the pipe both upstream and downstream of the filter.

Electronics

NYO-9193 $3.60

Institute of Mathematical Sciences, New York U., N. Y.
THE BOUNDARY LAYER IN THE CONFINEMENT OF A ONE-DIMENSIONAL PLASMA, by W. Paskievici, A. Sestero, and H. Weitzner. Rept. on Contract AT(30-1)-1480. 15 July 62, 31p. MF-31.

NASA N62-12745 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
RADIATION FROM A PARABOLOID WITH AXIAL-DIPOLE FEED, by W. V. T. Rusch. Rept. on Contract NASw-6. 31 Oct 61, 15p. 4 refs. Technical rept. no. 32-170.

UCRL-6632 $1.10

Lawrence Radiation Lab., U. of California, Livermore.
A POWER RELATION FOR A PLASMA, by D. D. Reagan. Rept. on Contract W-7405-eng-48. 22 Sep 61, 6p. 1 ref.

NASA N63-11135 $4.60

Lockheed-California Co., Burbank.
INFLUENCE OF GEOMETRIC ATTENUATION OF HYDROMAGNETIC WAVES ON THE SUDDEN COMMENCEMENT OF MAGNETIC STORMS, by Erich J. Stegelmann and Carl H. von Kenschitzki. Rept. on Contract NASw-256. July 62, 48p. 7 refs. Plasma physics rept. no. 1; LR-16085.

AD-279 856 $1.10

Massachusetts Inst. of Tech., Cambridge.
RESEARCH ON HYDROMAGNETIC SHOCKS. Final rept. 1 Oct 58-30 Sep 61, on Contract AF 19(604)4551. [1961] 8p. 7 refs. AFCRL-62-230; NASA N62-11186.

DESCRIPTORS: *Shock waves, *Magnetohydrodynamics, Magnetic fields, Waveguides, Electromagnets, Shock tubes, Photographic analysis, Containment, Gas ionization, *Plasma physics, Diffusion.

The primary aim of this research was to investigate the behavior of plane shock waves in the presence of uniform and non-uniform magnetic fields, the gas behind the shock being electrically conducting. This work was carried out in several phases, each of which is briefly described.

TID-16535 $7.60

Tennessee U., Knoxville.
THE TWO-STREAM INSTABILITY IN A FINITE PLASMA, by Gordon K. Soper. Master's thesis. Aug 62, 79p. 25 refs.

TID-17303 $18.50

Research Lab. of Electronics, Massachusetts Inst. of Tech., Cambridge.
QUARTERLY PROGRESS REPORT NO. 67, by H. J. Zimmermann, G. G. Harvey, and W. B. Davenport, Jr. 15 Oct 62, 304p. 175 refs.

Molecular Physics and Spectroscopy

UCRL-10377 $1.10

Lawrence Radiation Lab., U. of California, Berkeley.
THE DETERMINATION OF MOLECULAR STRUCTURE FROM ROTATIONAL SPECTRA, by Victor W. Laurie and Dudley R. Herschbach. Rept. on Contract W-7405-eng-48. July 62, 5p. 5 refs.

UCRL-10411 $4.60

Lawrence Radiation Lab., U. of California, Berkeley.
DOPPLER LINE SHAPE OF ATOMIC FLUORESCENCE EXCITED BY MOLECULAR PHOTODISSOCIATION, by Richard N. Zare and Dudley R. Herschbach. Rept. on Contract W-7405-eng-48. Aug 62, 43p. 20 refs.

UCRL-10422 $0.50

Lawrence Radiation Lab., U. of California, Berkeley.
HIGH RESOLUTION PROTON MAGNETIC RESONANCE SPECTRA OF SILYLPHOSPHINE, SILYLARSINE, GERMYLPHOSPHINE AND GERMYLARSINE, by J. E. Drake and W. L. Jolly. Rept. on Contract W-7405-eng-48. Aug 62, 13p. 4 refs.

AD-288 812 repriced $1.25

Naval Ordnance Lab., White Oak, Md.
THE EFFECTS OF ARGON AND HELIUM COLLISIONS ON THE FIRST PRINCIPAL DOUBLET OF SINGLY IONIZED BARIUM, by Gordon L. Hammond. Oct 62, 42p. 35 refs. Rept. no. NOLTR 62-122.

DESCRIPTORS: *Stars, *Atmosphere, Theory, Spectrographic analysis, *Argon, *Helium, *Barium, Ionization, Frequency, Shift, High pressure research, High temperature research.

The frequency shifts and half-widths of the $^2S - ^2P$ resonance doublet of Ba II have been measured in the range of pressures from 400 to 1100 atmospheres with accompanying temperatures of 3300 to 5000°K. $BaCl_2$ powder was vaporized in Ar or He adiabatically compressed by a gas-driven piston in a closed cylinder, thus generating a hot dense gas containing Ba atoms and ions (Physics--Spectroscopy, 20 Mar 63, released 20 Feb 63) (over)

as additives. With He as the perturbing gas, the $^2P_{1/2}$ (λ 4934A) component of Ba II shifted toward the violet, while the $^2P_{3/2}$ (λ 4554A) component remained unshifted, and both lines exhibited symmetric intensity profiles. With Ar as the perturbing gas, both lines shifted toward the red, the $^2P_{1/2}$ component exhibiting a greater shift, and both lines showed marked red asymmetry. Qualitative agreement was observed between the behavior of these Ba II lines and the corresponding lines of neutral alkali atoms perturbed by the same gases, but the form of the interaction law between these excited ions and rare gas atoms could not be determined. (Author)

TID-12755 $3.60

Westinghouse Electric Corp., Pittsburgh, Pa.
INFRARED SPECTRA OF URANIUM COMPOUNDS AND THE CHARACTERISTIC FREQUENCIES OF THE URANYL ION, by J. H. Lady and R. E. Adams. 31 July 57, 35p. Research rept. 6-94602-9-R12. NP-9624.

Optics

TID-17263 $1.60

Colorado U., Boulder.
THE SCINTILLATION PROPERTIES OF COORDINATION COMPOUNDS, by R. N. Keller. Final scientific rept. on Contract AT(11-1)261. 30 June 62, 14p. 8 refs.

AD-260 900 $2.60

Naval Ordnance Lab., Corona, Calif.
PROCEDURES USED IN THE STUDY OF THE PROPERTIES OF PHOTODETECTORS, by W. L. Eisenman. Rept. no. 46 on Photodetector Series. 1 July 61, 23p. 5 refs. NOLC rept. 541.

DESCRIPTORS: *Infrared detectors, Infrared photoconductors, Sensitivity, Spectrographic analysis, Infrared spectroscopy, Noise analyzers, Noise, Frequency, Frequency analyzers, Instrumentation, Measurement, Electronic equipment.

This report describes the equipment and the techniques used in obtaining the following measurements on photodetectors: responsivity, spectral response, noise measurements, and frequency response. An explanation is given also of the manner in which figures of merit are computed from these data. (Author) (See also AD 260 028)

Solid State Physics

IS-268 $1.60

Ames Lab., Iowa State U. of Science and Tech.
POINT IMPERFECTIONS IN METALS: EXISTANCE AND DETECTION, by J. F. Smith. Rept. on Contract [W7405-eng-82]. [23 Feb 61] 12p.

TID-16720 $1.60

Argonne National Lab., Ill.
ENERGY BANDS AND LINE SHAPE OF ULTRAVIOLET REFLECTIVITY OF Ge AND Si, by J. C. Phillips, D. Brust, and F. Bassani. Rept. on Contract W31-109-eng-38. June 62, 13p. 27 refs.

TID-17067 $6.60

Bartol Research Foundation, Swarthmore, Pa.
SOLID STATE INVESTIGATIONS UTILIZING ELECTRON-BOMBARDMENT PHENOMENA, by Martin A. Pomerantz. Annual progress rept. for 1962, on Contract AT(30-1)-2730. 2 Nov 62, 56p. 33 refs.

BNL-6375 $1.60

Brookhaven National Lab., Upton, N. Y.
DYNAMICS OF RADIATION DAMAGE: A REPORT ON RECENT RESULTS AT BNL, by George H. Vineyard. 13 Nov 62, 21p. 9 refs.

BNL-6322 $1.60

Brookhaven National Lab., Upton, N. Y.
THEORY OF POINT DEFECT ANNEALING IN METALS, by A. C. Damask and G. J. Dienes. [8 Oct 62] 13p. 8 refs.

PB 162 436 $2.60

Cryogenic Lab., Ohio State U. Research Foundation, Columbus.
HIGH TEMPERATURE STRUCTURE AND THERMAL EXPANSION OF SOME METALS AS DETERMINED FOR HIGH TEMPERATURE X-RAY DIFFRACTION DATA. I. COLUMBIUM AND PLATINUM, by James W. Edwards, Rudolph Speiser, and Herrick L. Johnston. Technical rept. no. 4 on High Temperature Thermodynamics of Inorganic Substances, Contract N6ori-17, T.O. IV. 1 July 49, 22p. 8 refs. Project RF-280; ATI 85 892.

DESCRIPTORS: Metals, *Niobium, *Platinum, Thermal expansion, Crystal structure, High temperature research, Thermodynamics, X-ray diffraction analysis.

High temperature x-ray structure and the thermal expansion of metals are being studied in connection with the program of high temperature thermodynamics of inorganic substances being carried on in this Laboratory. A high temperature x-ray diffraction camera utilizing induction heating was employed in this research. The heating characteristics of several new furnace element designs and a new method of establishing the temperature scale within the x-ray camera are described. No changes in the crystal structure of either columbium or platinum in the range of temperatures covered in this investigation were encountered, consequently only thermal expansion data are reported. (Author)

KAPL-M-FHG-1 $1.10

Knolls Atomic Power Lab., Schenectady, N. Y.
X-RAY ANALYSIS METHODS APPLIED TO THE B_4C-SiC SYSTEM, by Franklin H. Guzzetta. Rept. on Contract W-31-109-eng-52. 29 June 62, 9p. 2 refs.

UCRL-6752 $1.60

Lawrence Radiation Lab., U. of California, Livermore.
THE CRYSTAL STRUCTURE OF Ru_3Be_{17}, by Donald E. Sands, Quintin C. Johnson and others. Rept. on Contract W-7405-eng-48. 23 Jan 62, 15p. 13 refs.

UCRL-10200 $2.60

Lawrence Radiation Lab., U. of California, Berkeley.
DISLOCATION MULTIPLICATION, by J. Washburn, Rept. on Contract W-7405-eng-48. June 62, 30p. 17 refs.

UCRL-10427 $1.60

Lawrence Radiation Lab., U. of California, Berkeley.
INTERACTION BETWEEN PRISMATIC AND GLISSILE DISLOCATIONS, by G. Saada and J. Washburn. Rept. on Contract W-7405-eng-48. Aug 62, 20p. 20 refs.

NASA N62-17072 $23.50/3 vols.

National Aeronautics and Space Administration, Washington, D. C.
PREPRINTS OF PAPERS FOR SYMPOSIUM ON MEASUREMENT OF THERMAL RADIATION PROPERTIES OF SOLIDS. Symposium held at Dayton, Ohio, 5-7 Sep 62. [1962] 491p. in 3 vols. 173 refs.

AD-285 272 repriced $0.50

Naval Ordnance Lab., White Oak, Md.
LINE WIDTH MEASUREMENT ON SINGLE CRYSTAL YTTRIUM-IRON GARNET, by A. D. Krall. 6 Apr 62, 18p. 7 refs. Rept. no. NOLTR 62-44.

DESCRIPTORS: Single crystals, *Yttrium, *Iron, *Garnet, Ferromagnetism, *Ferromagnetic materials, *Microwave frequency, Waveguides, Wave analysis, Theory, Measurement.

A simple, quick measurement of narrow (about 1 oersted) line width ferromagnets by the use of reradiated microwave fields is described. The equations of motion are combined with the electromagnetic field equations and then solved to show what is being measured and how the measurement should be made. Experimental equipment is described in detail. (Author)

ORNL-TM-305 $7.60

Oak Ridge National Lab., Tenn.
OR FLS, A FORTRAN CRYSTALLOGRAPHIC LEAST-SQUARES PROGRAM, by W. R. Busing, K. O. Martin, and H. A. Levy. Rept. on Contract W-7405-eng-26. 21 Nov 62, 77p.

TID-17260 $12.50

Rensselaer Polytechnic Inst., Troy, N. Y.
POINT DEFECTS IN COPPER, by Robert A. Johnson. Doctoral thesis. Rept. on Contract AT(30-1)1995. Nov 62, 172p. 73 refs.

Theoretical Physics

UCRL-6657 $3.60

Lawrence Radiation Lab., U. of California, Livermore.
EVALUATION OF THE QUANTUM MECHANICAL RING SUM WITH BOLTZMANN STATISTICS, by Hughe E. DeWitt. Rept. on Contract W-7405-eng-48. 16 Oct 61, 35p. 12 refs.

NASA N62-10651 $1.10

Rennsselaer Polytechnic Inst., Troy, N. Y.
SEMIANNUAL STATUS REPORT NO. 4. Rept. for 1 May-31 Oct 61 on Grant NsG 48-60. 1961, 10p. 13 refs.

Thermodynamics

AD-267 262 repriced $2.75

Airesearch Mfg. Co., Los Angeles, Calif.
THERMODYNAMIC PROPERTIES OF 20.4° K-EQUILIBRIUM HYDROGEN, by A. Shaffer and J. Rousseau. Rept. on Contract AF 33(616)7895. Oct 61, 128p. 12 refs. ASD Technical rept. 61-360.

DESCRIPTORS: *Hydrogen, *Thermodynamics, Pressure, Temperature, *Gases, *High temperature research, Entropy, Enthalpy, Pressure, Density, Dissociation.

The thermodynamic properties of 20.4K-equilibrium hydrogen are presented for pressures between 1 and 3000 psia and temperatures between 25 and 5000 R. Several graphical representations of the data are given. These consist of temperature-entropy, enthalpy-entropy, pressure-enthalpy, temperature-enthalpy, and tempeaue-ensity diagram. Data are given to show the effect of ortho-para composition of hydrogen properties over the range of temperatures considered. High-temperature gas properties shown include the effects of dissociation and non-ideal gas behavior. (Author)

NASA N63-10641 $5.60

California U., Los Angeles.
STABILITY OF FILM BOILING TWO-PHASE FLOW IN CRYOGENIC SYSTEMS, by T. H. K. Frederking. Rept on Grant NsG-237-62. [1962] 56p. 39 refs.

TID-16972 $2.60

Engineering Research Labs., Columbia U., New York.
BASIC EXPERIMENTAL STUDIES OF BOILING FLUID FLOW AND HEAT TRANSFER AT ELEVATED PRESSURES, by Bruce Matzner. Monthly progress rept. for Sep 62, on Contract AT(30-3)-187. 28 Sep 62, 11p.

HW-75148 $1.10

Hanford Atomic Products Operation, Richland, Wash.
THERMAL EXPANSION OF URANIUM DIOXIDE, by J. A. Christensen. Rept. on Contract AT(45-1)1350. 4 Oct 62, 9p. 3 refs.

NASA N62-12150 $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
RADIATION EXCHANGE BETWEEN TWO FLAT SURFACES SEPARATED BY AN ABSORBING GAS, by Robert V. Meghreblian. Rept. on Contract NAS7-100. 6 Apr 62, 22p. 8 refs. Technical rept. no. 32-197.

UCRL-6569 $2.60

Lawrence Radiation Lab., U. of California, Livermore.
ASYMMETRICAL THERMAL STRESS DISTRIBUTION IN REACTOR FUEL TUBES, by LaMar I. Deverall. Rept. on Contract W-7405-eng-48. 14 Aug 61, 25p. 6 refs.

TID-17049 $1.60

Minnesota U., Minneapolis.
RATES OF EVAPORATION, by George R. Gavalas. Bimonthly rept. no. 14, on Contract AT(11-1)926. Sep 62, 14p. 9 refs.

TID-17050 $1.60

Minnesota U., Minneapolis.
TEMPERATURE DISTRIBUTION AND VAPORIZATION RATES IN A SUPERHEATED LIQUID JET, by George R. Gavalas. Bimonthly rept. no. 14, on Contract AT(11-1)926. Sep 62, 13p.

NASA N62-10652 $6.60

National Bureau of Standards, Boulder, Colo.
CRYOGENICS RESEARCH AND DEVELOPMENT. Progress rept. no. 4, for the period ending 31 Dec 61, on NASA order R-13. 31 Dec 61, 66p. refs. NBS rept. no. 7219.

NASA N63-10802 $0.75

Rocket Research Lab., Ohio State U., Columbus.
THERMODYNAMIC CALCULATIONS OF CARBON MONOXIDE - AIR DETONATION PARAMETERS FOR INITIAL PRESSURES FROM 1 TO 100 ATMOSPHERES, by Loren E. Bolling and Rudolph Edse. Rept. on Grant NsG-44-60. Dec 62, 30p. NASA Technical note D-1667.

PB 162 614 $7.60

Stanford U., Calif.
NUMERICAL SOLUTIONS FOR LAMINAR FLOW HEAT TRANSFER IN CIRCULAR TUBES, by W. M. Kays. Technical rept. no. 20 on Contract N6onr-251, T.O. 6. 15 Oct 53, 79p. 13 refs. AD-18 904.

DESCRIPTORS: *Pipes, *Heat transfer, Fluid flow, Gas flow, Fluid dynamic properties, Laminar boundary layer, Velocity, Thermodynamics, *Numerical methods and procedures, Difference equations, Heat exchangers.

A numerical method is employed, along with the velocity profiles of Langhaar (J. Applied Mechanics, June 1942), to obtain solutions for a number of boundary conditions at Pr = 0.70. A description is given of the method of integration of the energy equation. The constants employed in the computation are tabulated in the appendix. The method is substantiated by comparing the constant wall temperature and parabolic velocity distribution solution to the corresponding Graetz solution. The Nusselt numbers obtained agree within 2%. Additional experimental data are needed for very short tubes where the numerical solution tends to become inaccurate.

Wave Propagation

NASA N63-10689 $2.60

Southwest Center for Advanced Studies, Dallas, Tex.
HYDROMAGNETIC REFLECTION AND REFRACTION AT A FLUID VELOCITY-DISCONTINUITY, by J. A. Fejer. Rept. on Grant NsG-269-62. 23 Oct 62, 21p. 16 refs.

NASA N63-11124 $1.00

Sylvania Electric Products, Inc., Waltham, Mass.
HYDROMAGNETIC WAVE PROPAGATION IN A CONSTANT DIPOLE MAGNETIC FIELD, by John Carstoiu. Rept. on Contract NASr-18. Dec 62, 37p. 24 refs. NASA Technical note D-1689.

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

NASA N62-12676 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
MEASUREMENTS ON TIME-VARIANT COMMUNICATION CHANNELS, by Thomas Kailath. Rept. on Contract NAS7-100. 21 May 62, 11p. 11 refs. Technical rept. no. 32-267.

NASA N62-12171 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
RESEARCH SUMMARY NO. 36-13. Rept. for 1 Dec 61-1 Feb 62, on Contract NAS7-100. 1 Mar 62, 131p. 108 refs.

NASA N62-12820 $11.50

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
RESEARCH SUMMARY NO. 36-14. Rept. for 1 Feb-1 Apr 62, on Contract NAS7-100. 1 May 62, 160p. refs.

SOCIAL SCIENCES

TID-17037 $3.60

Sandia Corp., Albuquerque, N. Mex.
EVALUATION OF CONTRACTOR QUALITY CONTROL SYSTEMS, by A. F. Cone, David L. Field, and Jean LaPaz. Rept. on Contract AT(29-1)789. [1962]. 35p. 12 refs. SCDC-2908.

Documentation

PB 181 422 $1.00

Armed Services Technical Information Agency, Arlington, Va.
ASTIA CHEMICAL THESAURUS, by Julius Frome, Joseph F. Caponio and others. 1st ed, Dec 62, 33p.

DESCRIPTORS: Documentation, *Chemistry, *Information retrieval, Indexes, *Subject indexing, Library science.

The ASTIA CHEMICAL THESAURUS has been prepared to provide those users primarily interested in chemistry with a tool for indexing and retrieving chemical documents. This Thesaurus brings together all chemical or related retrieval terms for biochemistry, organic chemistry, and the metals and alloys. The terms reflect the revised method for indexing organic chemicals which involves separating the molecular structure into predetermined fragments which are, for the most part, the common functional groups. The retrieval of the chemical compounds is based on the correlation of these same fragment descriptions. The Thesaurus is divided into the following five major sections: (1) Indexing Guidelines: (2) Alphabetical Listing; (3) Fragment Descriptions; (4) Miscellaneous Terminology; (5) Appendix.

PB 181 457 $8.00

Armed Services Technical Information Agency, Arlington, Va.
THESAURUS OF ASTIA DESCRIPTORS, SECOND EDITION (FIRST REVISION). Dec 62, 677p. supersedes rept. dated May 60, PB 161 681, AD-235 000.

DESCRIPTORS: Documentation, *Information retrieval, Indexes, *Subject indexing, Library science.

MISCELLANEOUS

PB 181 410 $1.25, $10.00/year

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS. Feb 63.

DESCRIPTORS: *Naval research, *Scientific research, Radioactivity, Nuclear explosions, Transducers, Atmosphere, Astrophysics, Planets, Polarization, Chemistry, Polymers, Degradation, Methyl radicals, Acrylates, Thermal conductivity, Shelters, Electricity,

Dynamos, Mechanics, Rocket motor nozzles, Tungsten, Shock (Mechanics), Metallurgy, Ceramic materials, Steel, Magnesium compounds, Oxides, Vanadium compounds, Radio, Antennas, High frequency, Signals, Satellite vehicles, Very low frequency, Precision equipment, Radio receivers, Solid state physics, Transistors, Microanalysis, Sound, Hydrophones, Acoustics, Scientific reports, Patents.

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Airborne Radioactivity from Nuclear Tests, 1958-1962, by L. B. Lockhart, Jr.
The U. S. Naval Research Laboratory's Transducer Measurement Platform on Seneca Lake, by H. L. Saxton and H. E. Eney
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Atmosphere and Astrophysics: Linear polarization of the 3200-Mc radiation from Saturn
Chemistry: Photodegradation of high polymers--Photolysis of poly(methyl acrylate) in vacuum and in air. Effect of pressure on the thermal conductivity of a gas. Results of winter trials of BuY&D protective shelter constructed at the National Naval Medical Center.
Electricity: Field reversals of "paleomagnetic" type in coupled disk dynamos
Mechanics: Thermal shock effects in several types of sintered tungsten rocket nozzle throat inserts
Metallurgy and Ceramics: Crack toughness of two high-strength sheet steels. Tensile and impact properties of some maraging steel compositions. High-temperature chemistry of the system $MgO-V_2O_5$. Fracture topology in high-strength steels
Radio: Logarithmically periodic antenna for the 3-Mc to 12-Mc band. Ionospheric penetration of high-frequency signals from the S-27 satellite. New precision frequency standardization technique for vlf receivers such as the model RBA
Solid State Physics: Transistorized multichannel analyzer adapted for use with NRL's electron probe microanalyzer
Sound: Graphical determination of the response of a simple line hydrophone to two acoustic sources.
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